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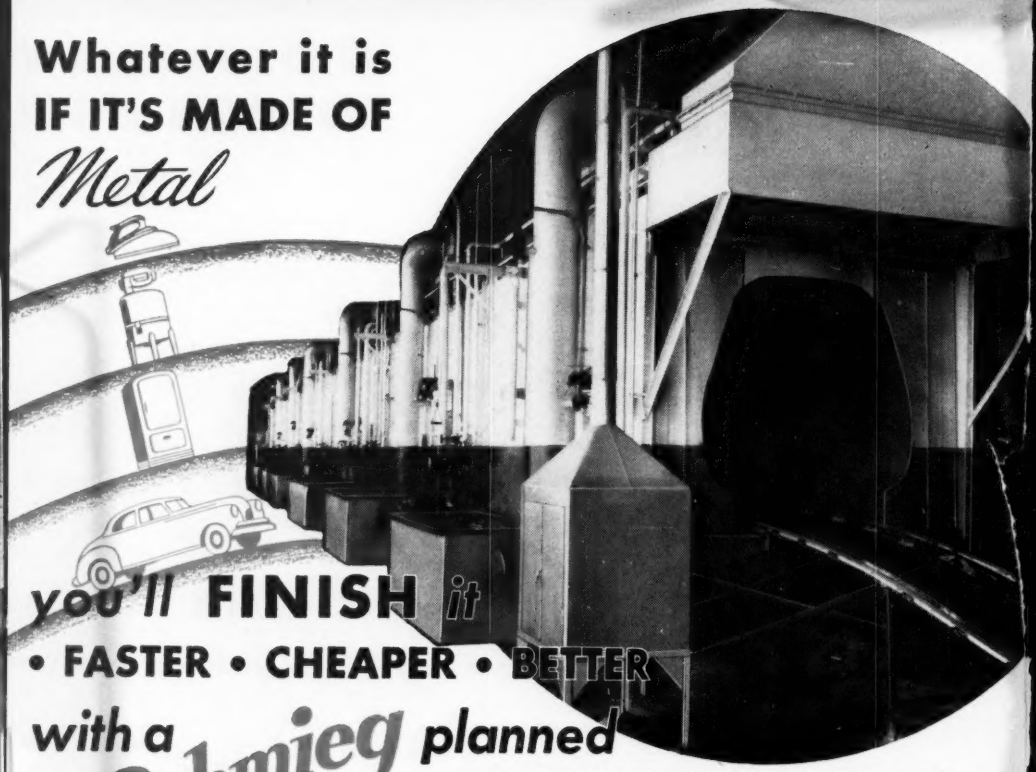

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See Page 3

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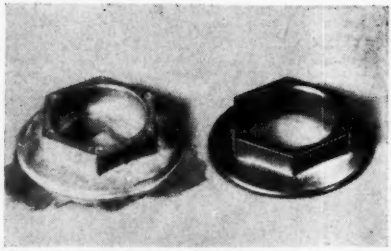

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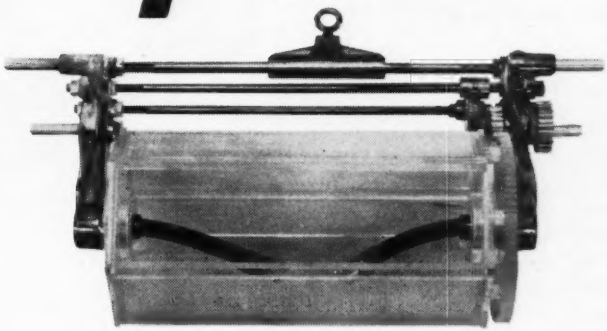

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EZRA A. BLOUNT, *Editor*

Products finishing

JUNE 1951
VOLUME 15 • NUMBER 9

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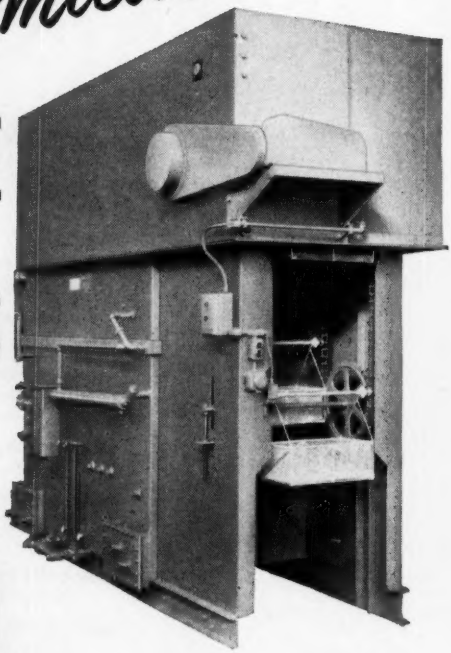

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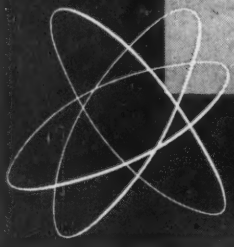

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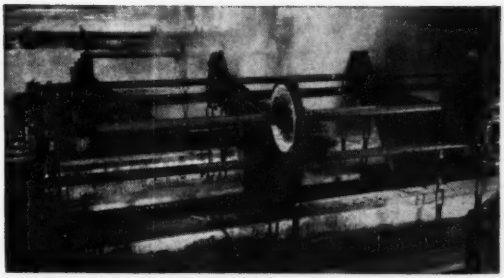

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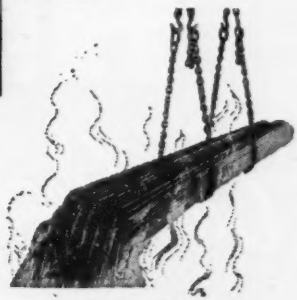

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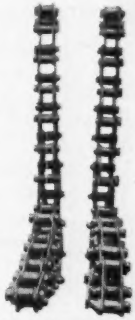

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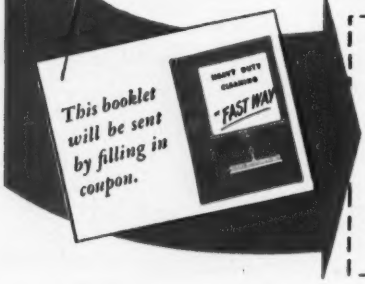

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PF editorial

Vol. 15, No. 9

JUNE, 1951

PAINT, VARNISH, LACQUER, ENAMEL

"Now you're just the man I want to see," said Mr. J. O. B. Finisher, as his Favorite Paint Salesman entered the shop. "We have been having an argument about some of the paint products that we use," he continued, "and I would like to know just what they are and how they differ from one another."

"Glad to help you," said the F. P. S., glancing down at his copy of the National Paint Directory, which he always carried for such emergencies. "Let's see how some of these products are defined. A LACQUER is a liquid composition containing cellulose esters or ethers as the basic film-forming ingredients. The term LACQUER usually indicates that the material dries by evaporation and forms a film from the non-volatile constituents."

"Now an ENAMEL," the F. P. S. continued, "is a kind of paint consisting of pigments and vehicle and characterized by its ability to form an especially smooth film. PAINT includes all materials capable of being *spread* on a substrate, such as oil, varnish, lacquer, oil paint, water paint, enamel, creosote, and so on. PAINT differs from ENAMEL in consistency properties; PAINT and ENAMEL are extremes between which all gradations in properties are possible."

"A VARNISH is defined as being any homogeneous, transparent or translucent liquid which, when applied as a thin film, dries on exposure to air to a continuous film, giving a decorative and protective coating to the surface to which it is applied. A SYNTHETIC (resin) is a chemical compound manufactured artificially from simpler compounds in contrast to naturally occuring materials. SYNTHETIC protective coatings are, of course, those containing synthetic resins. When some natural resins are used in a synthetic coating, then it is called a MODIFIED SYNTHETIC."

"Of course," continued the F. P. S., wishing to get in a "plug", "you are familiar with our BAKING LACQUER and our LACQUER ENAMEL (a term used to denote a pigmented nitrocellulose lacquer, or quick-dry coating that usually dries with a gloss)."

At this point Mr. J. O. B. Finisher was less sure than before that he understood the properties of the several coating materials mentioned.

Hoping to bring Mr. Finisher back to solid ground, the F .P. S. attempted to end the discussion with, "You see, to simplify all these terms, we call these coatings INDUSTRIAL FINISHES."

"But," said Mr. J. O. B. Finisher, "I apply finishes of many kinds, such as electroplated finishes and galvanized finishes. There are also porcelain or vitreous enamel finishes. Aren't these INDUSTRIAL FINISHES too?"

At this, the F. P. S. threw up his hands and vanished out the door, and as he left the shop, he was heard to mutter, "Maybe the Protective Coatings Industry needs some new words or word to describe its products—or fewer of the words now being used."

What do you think?

Ezra A. Blount

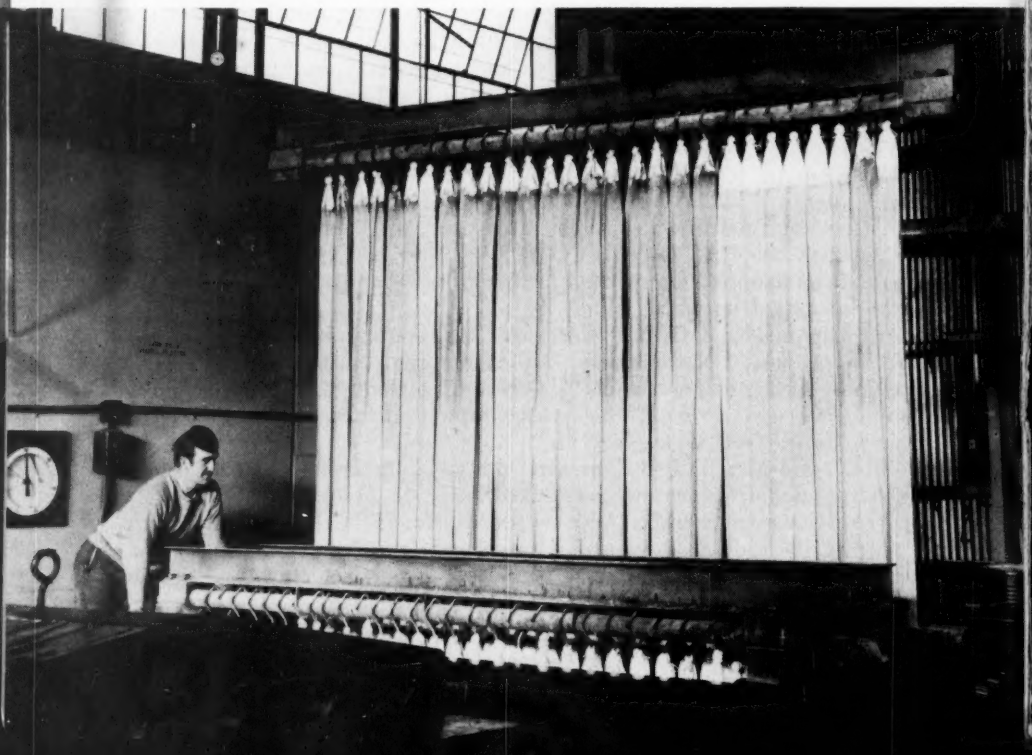
—EDITOR

Electroplating Aids in Clad Steel Production

By S. E. SANGSTER
American Electroplaters' Society

IN many of the nation's huge industries such as the chemical, petroleum, pulp and paper, food and textile, processing equipment must be corrosion-resistant. For these purposes the use of metal alloys such as stainless steel, Monel, nickel, or Inconel are specified. However, the question of cost becomes a major factor when such metal alloys must be considered. These alloys are quite expensive as compared with low alloy steel and they also lack

Fig. 1—Bagged nickel anodes on anode rod ready for immersion in the main plating tank.



the physical properties of the latter. In order to meet this industrial problem, the use of clad steel has, during recent years, been widely adopted.

One of the pioneer producers of clad steel in the United States has aptly defined it as "a composite plate consisting of a carbon or low alloy steel backing plate, to which a cladding of some corrosion-resistant metal is inseparably and uniformly bonded to one or both surfaces."

Most commonly found as the cladding metal in today's clad steel is either stainless steel or Inconel. Products made from clad steel of this composition include tanks, evaporators, digestors, cookers, mixers, atmospheric and vacuum towers, coking drums, fractionating columns, chutes, bunkers, expansion joints, venturi tubes—just to mention a few items of a long and varied list.

When the steel companies started developing clad steels employing stainless steel and Inconel as insert metals, they found that to obtain a satisfactory bond, it was necessary to prevent any oxide film from forming on the bonding surface of the insert. After trying and discarding numerous expedients, it was discovered that the solution lay in nickel plating the bonding surface of the stainless steel or Inconel insert, after a thorough pickling had removed the surface oxide and provided a chemically clean surface.

This nickel plate of 0.005-inch thickness has been found to be the most satisfactory plating material, inasmuch as nickel is soluble in steel in all proportions, and at the same time it serves

Fig. 2—Stainless steel "inserts", 106 x 32 inches, one side of which is covered with a stop-off plastic coating, being given a two-hour electrolytic deposit of nickel. The bonding coating is held at 0.005-inch thickness.

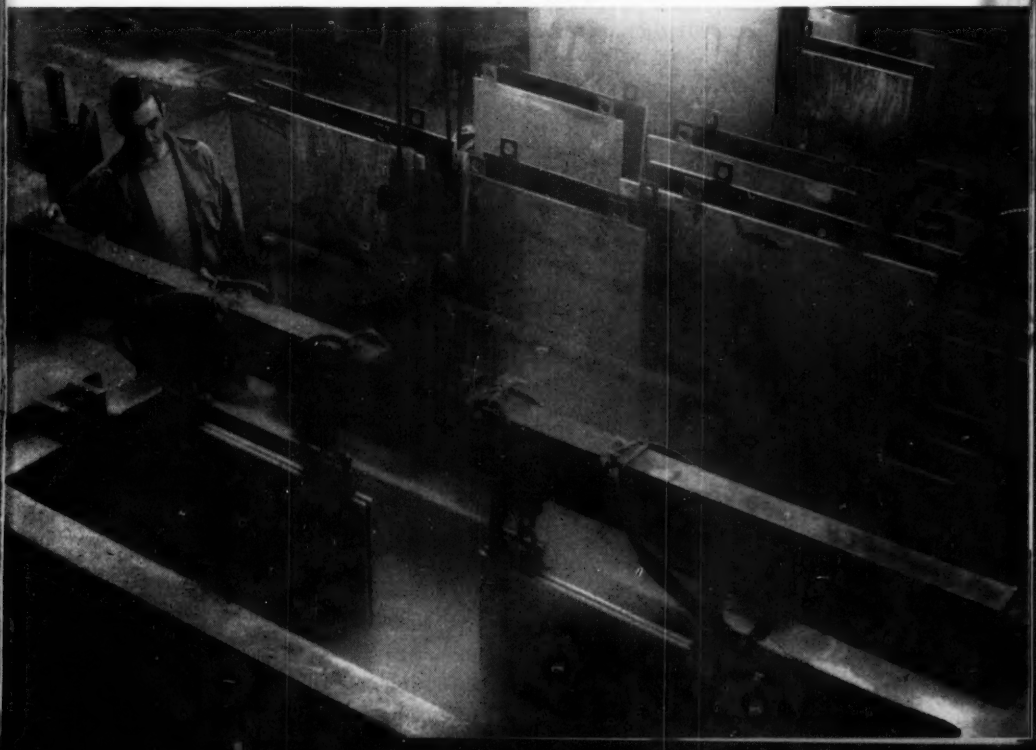


Fig. 4—In the assembly step shown here, the nickel plated face of the "insert" is being positioned on a previously grit blasted carbon steel backing plate, in the process of making up the "sandwich" preliminary to heating and rolling.

as a buffer against carbon migration from the low alloy backing steel into the insert metal. The uniformly high bond strength over the entire clad area, because of the intimate bond that is developed, also guarantees high heat transfer properties in the finished clad plate.

Cladding Process

The assembly processing of clad steel in the Lukens plant, whence the writer obtained his data, starts with the application of a plastic stop-off material to one side of the stainless steel or Inconel insert, ranging normally to 106 x 32 inches in dimensions, in order that only the bonding surface will be plated with nickel. The inserts are then processed through a two-hour plating cycle in the main plating tanks, which results in the desired 0.005-inch thick electrolytic nickel deposit (see Figs. 1 and 2).

After plating, the stop-off plastic coating is removed from the reverse surface of the insert (Fig. 3). The insert is then superimposed with the nickel plated side down (see Fig. 4) on a previously grit blasted steel backing plate. The thicknesses of both insert and backing plate are carefully predetermined so that the desired proportion or thickness of cladding in the finished plate will be obtained. Then a similar assembly, in the reversed position, is prepared and positioned on top of

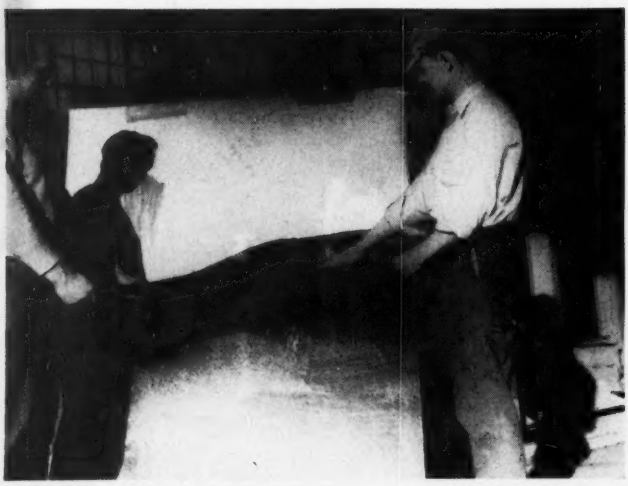


Fig. 3—Upon completion of the nickel electroplating, the "inserts" have the plastic stop-off coating stripped from the reverse side.

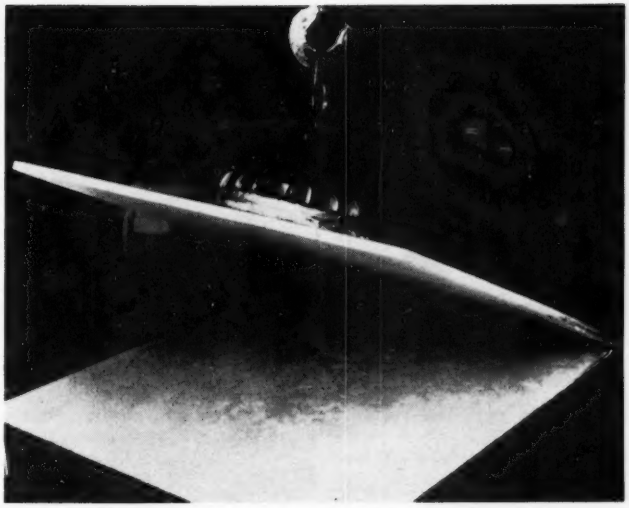


Fig. 6—After the welded edges have been flame cut, a magnet crane separates the two clad steel plates, each of which consists of a stainless steel cladding permanently bonded to its carbon steel backing.
(All photos courtesy Lukens Steel Co., Coatesville, Pa.)

the first assembly, with an infusible parting compound separating the two corrosion - resistant surfaces which face one another.

The entire pack or "sandwich" is then completely sealed by automatic welding and heated in a soaking pit to a temperature of from 2100 to 2300 deg. F. It is then rolled in order to reduce the components to the desired thickness (see Fig. 5). During this rolling the bond between the insert and the backing plate (composed of the electrolytically-deposited nickel) is automatically formed by pressure welding.

Following the rolling, the pack is sheared or flame cut inside the welded edges and separated by a magnet crane into two clad steel plates (see Fig. 6), each of which consists of a corrosion - resistant cladding permanently and uniformly bonded to a steel backing plate. Double-clad steel plates are made similar-

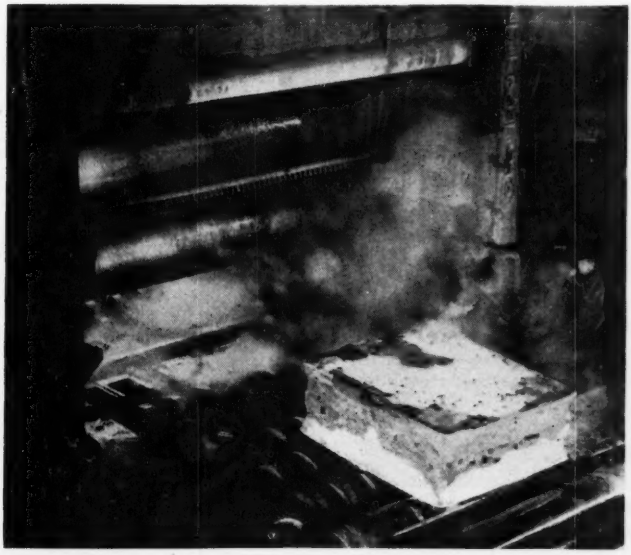


Fig. 5—Rolling the clad steel pack in order to reduce it to desired thickness and bond the components.

ly, the only difference being in the makeup of the pack prior to rolling.

The production cost of a stainless steel or Inconel clad steel plate made as described is about one-half that of a stainless steel plate of the same size. This, of course, varies somewhat depending on the application and the percentage of the thickness of the clad metal to the total thickness. As a general rule, the insert thickness runs from 10 to 20 per cent of the total thickness—but sometimes is less or more, as required by specifications.

Rhodium plate has been found useful for electrical contacts where low pressure rubbing contacts are involved.

It is perhaps a matter of common knowledge that light colors are cooler than dark colors. Because light colors reflect heat and light rays, they are more comfortable (in a house or in clothing) than dark colors which absorb heat radiation. Yet, how much difference is there between white and black.

The following facts have been released by the Color Research Laboratory of the Sun Chemical Corp., Long Island City, N. Y., and are based on data assembled by the U. S. Navy. In testing the effects of color on the heat absorption of shop helmets worn as a safety measure by enlisted and civilian personnel, a difference of 22 degrees Fahrenheit will be noted between black and white (or aluminum) helmets on a summer day when the temperature is about 100 degrees. Here are a few actual figures: outside temperature, 100 degrees; temperature inside white or aluminum helmet, 108 degrees; temperature inside black helmet, 130 degrees; yellow helmet, 112 degrees; aluminum under black helmet, 126 degrees.

The differences are significant enough to warrant consideration of white on storage tanks both to keep contents cool and to reduce costly evaporation.

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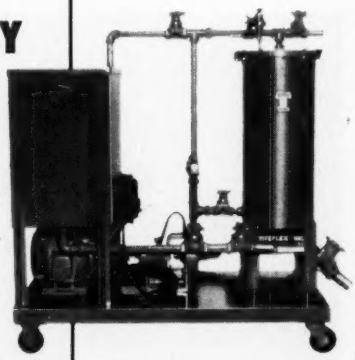

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New Supersheen compounds have played an important part in attaining finer finishes, faster processing. Almco developed its own barrel finishing compounds to insure "a better finish faster".

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Standardization and Simplification in The Coated Abrasives Industry

By HENRY R. POWER
The Carborundum Company
Niagara Falls, New York

ONE of the first industries to adopt the standardization and simplification program of the Department of Commerce under Secretary Herbert Hoover about 25 years ago was the coated abrasives industry, more commonly known as the sandpaper business. The national aim of the Hoover program was economy of production, efficient functioning, and effective management.

Standardization of Grain Sizes

The first problem of standardization concerned the variety of abrasive grain sizes then used for coating the various backings used in the industry. There were 19 sizes of silicon carbide, 12 sizes of fused alumina, and 14 sizes of garnet used by the several manufacturers. These sizes ranged from No. 20 grit passing No. 20 mesh sieve to No. 220 passing a 220 mesh sieve. Although marked the same as to size, these grains did not always possess standard dimensions, regardless of source of manufacture. The No. 120 silicon carbide made by one company was not always exactly the same size as No. 120 silicon carbide made by a competitor. It might be coarser or finer, and a customer changing from one to the other had to make allowance for this, or continue with one source of supply. Moreover, the abrasive grain size was not always the same with one manufacturer due to lack of control in sifting and testing the granular product. Lack of standards for abrasive grain sizing often left the maker with shelves of nondescript numbers and customers with useless varieties.

To prevent such waste for both the customer and the industry, size standards for coated abrasives were adopted and rigidly maintained. This required the adoption of a sifting test method, a standard grain to calibrate the silk bolting cloth test sieves, and tolerances or limits of both coarseness and fineness. Thus, each commercial size could be selected to match the percentage of control size, overgrade, and fines in the standrad sample for each grade of abrasive. This may be said to represent the first standardization in the coated abrasives industry. With the size of a grit number thus accurately defined, technical attention could be given the development phases of the coated abrasives business. This included problems relating to uniformity, cutting edges, toughness and hardness of the abrasive grain, and to its adhesion to glue and to the backing.

To obtain cutting edges on the granules of abrasive, it was necessary to produce in the electric furnace abrasive crude which was capable of fracturing with sharp edges, of being ground without dulling, and which was not too thin and slivery for hard usage. Proper milling of the abrasive to prevent dulling was found to be an important factor in the production of fused alumina grains to be used on the

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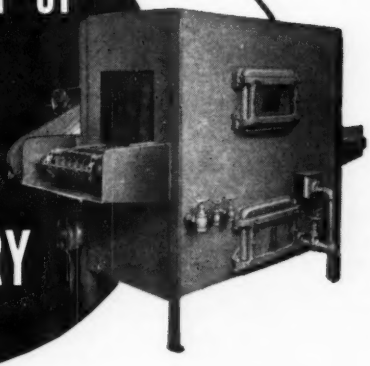

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higher speed woodworking machines to replace garnet, for example.

Likewise, in the metal-working field, the electric furnace aluminum oxide product has found increasing application because it can be produced with less matrix and more crystalline corundum, and can be technically controlled for duplication day in and day out.

Although there is naturally much overlapping of fields, the natural abrasives, such as flint (quartz) and garnet, are generally used on wood and other relatively soft materials; emery and electrically-fused aluminum oxide are invaluable for finishing metals, minerals, and other harder substances.

Silicon carbide is pre-eminent in finishing lacquers, paints in general, and in the leather shoe trade. For working metals low in tensile strength, silicon carbide has an advantage over electrically-fused alumina.

In addition to proper milling and sizing of the abrasive grains, much scientific progress was made on the preparation of the surface of the granule for proper bonding by the adhesive. The glassy surfaces of abrasive grains often are naturally glue-repellent and require treatment to permit the bond to form. It was found that abrasive grains showed specific surface adhesion effects like many other substances. The methods of improving the bond with adhesives included heating under controlled high temperatures, chemical treatments to etch the bright, smooth surfaces, and treatments which coat the grain surfaces with materials readily wet by adhesives. It was found that treatments satisfactory for maximum adhesion with animal glue did not suffice in every case for resinous adhesives.

Capillarity tests are regularly performed on abrasive grains before coating to confirm the fact that the surface is clean and will wet with the glue ad-

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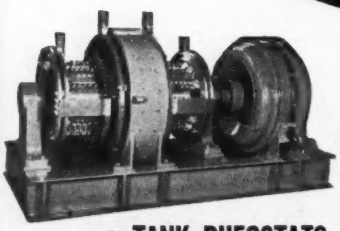

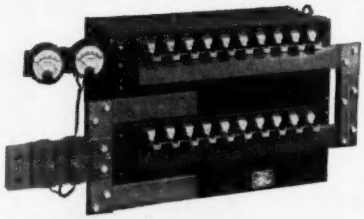

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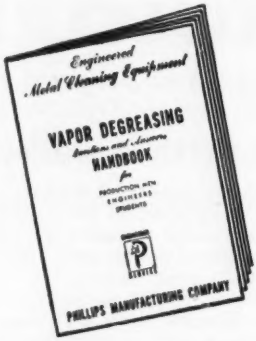
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hesive. The capillarity test is made with the aid of a tube of abrasive grains, one end of which is immersed in water. The height to which the water rises is measured, and is recorded as a measure of the capillarity.

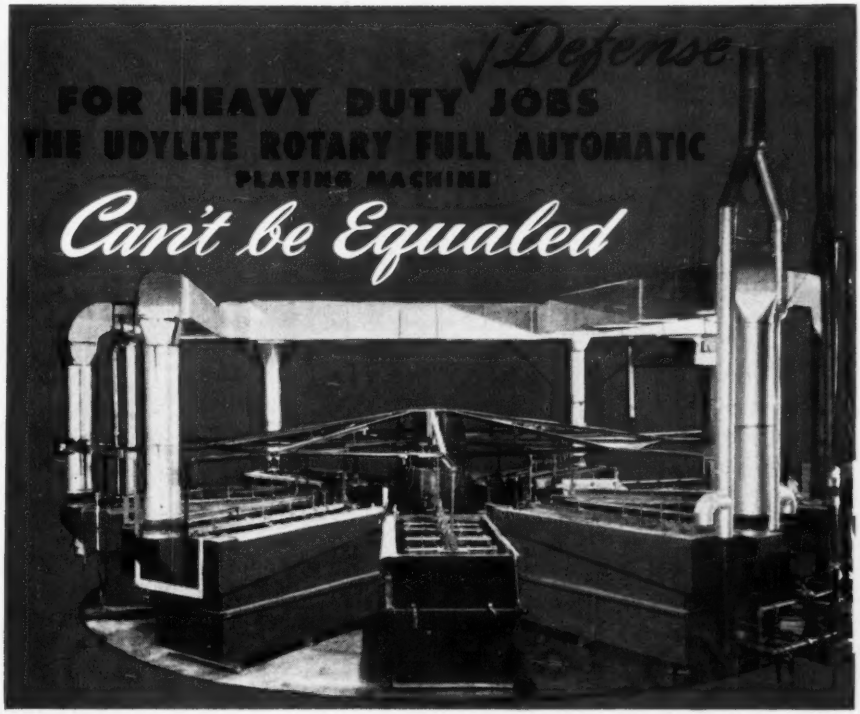
Improved Adhesives

Adhesives employed in bonding abrasive grains to the backing probably furnish the best example of industry cooperation with its suppliers. Animal hide glue has been prepared to specifications for viscosity, jell strength, foam, and keeping quality. This not only vastly improved sandpaper, but reflected credit on the glue maker's skill in this naturally difficult field of manufacturing. Studies were made of such other adhesives as bone, casein, and blood glues before the correct selection of glue enabled the abrasive industry to become the largest consumer of hide glue.

The proper type of material for the adhesive bond between the abrasive grains and the backing is one which holds the grains under a variety of weather conditions and also holds them when great strains are produced in use.

After this improved hide glue was perfected, a new condition of use for coated abrasives developed in the consuming market. This required a bond resistant to oil and water. One of the first applications was in the wet sanding of "orange peel" of lacquers used on motor cars, wherein kerosene, or water and turkey red oil, were employed to keep down the dust and the temperature of sanding. Animal glues, while they resist oils, do soften under conditions of heat and upon exposure to water. In succession, the adhesive for wet sanding abrasives progressed from animal glue to long oil rosin varnish, to oil-glyptal types, to oil phenol-formaldehyde, and thence to the modern thermosetting resin bonds. These resins possess the strength for hard grinding and may be used either wet or dry.

to page 26→



Here's the heavyweight champ of the metal finishing field—designed especially for those tough defense jobs—Udylite's Rotary Full Automatic. The tremendous power and flexibility of its hydraulic drive make a simple matter of processing work pieces of any size or shape. It's ideal for pickling and bonderizing shell and rocket casings—for etching stainless steel jet engine rotors—anodizing aluminum aircraft parts. It can handle any metal finishing operation vital to building the sinews of defense.

Mechanically simple, the Udylite Rotary is constructed in the shape of a cartwheel. The tanks may be arranged radially around the lift shaft like the spokes of a wheel or placed end to end like a wheel's rim. Either arrangement allows easy access to the tanks for servicing the solution. This machine is very easy to install—it is shipped ready to run. Since it has few moving parts, maintenance is held to a minimum. If you have a large volume of heavy parts production, it will pay you to ask your Udylite Technical Man about the Rotary Full Automatic for plating and other metal finishing processes. Or, if you prefer, write to us direct for full information. There's no obligation.

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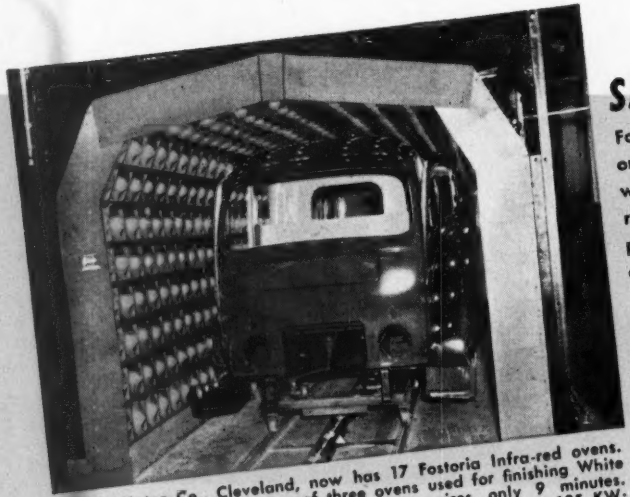


White Motor Co., Cleveland, now has 17 Fostoria Infra-red ovens. The photo above shows one of three ovens used for finishing White 3000 series Power Lift Cabs. Baking requires only 9 minutes. Operating cost is reasonable — dry-off oven, 18' 4" long, 135 KW; prime oven, 29' 4" long, 144 KW; finish oven, 29' 4" long, 128 KW.

SAVES SPACE

Fostoria Infra-red ovens operate on a comparatively short cycle which results in smaller oven requirements. They may be suspended from ceiling mounts to eliminate floor space entirely.

SAVES TIME

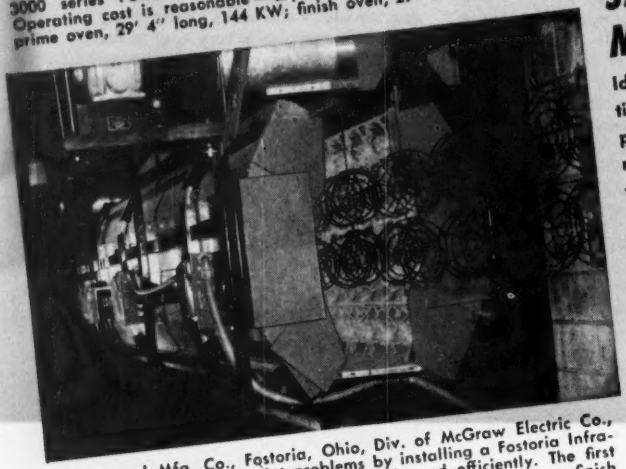
Reduces processing time from hours to minutes because of the inherent speed of Infra-red. There is no time lag in starting an oven. Heat is instantaneous.

SAVES MANPOWER—MANHOURS

Ideal for conveyorized production methods. Reduces expensive product handling. Turns out more pieces per day with ease, with less people.

CUTS COSTS

Faster production, lower operating costs, improved quality, result in lower "per piece" cost.



The Bersted Mfg. Co., Fostoria, Ohio, Div. of McGraw Electric Co., solved degreasing and paint problems by installing a Fostoria Infra-red oven. Fan guards are finished quickly and efficiently. The first trip through the oven, light oil is burned off. Then black japan finish is baked in 4 minutes. Production is 6,000 pieces per day. Oven is ceiling mounted saving floor space.

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YOUR FINISHING PRODUCTION *Cut Costs*

INDUSTRIAL OVENS FOR FINISH BAKING

FOSTORIA INFRA-RED

You'll be amazed at the savings you can make in space, time, manpower and costs — the marked increase in the efficiency and quality of your finishing production—by modernization with a Fostoria Engineered Infra-red Oven. *A Fostoria Infra-red System out-performs any other equipment on the market today.* Fostoria exclusive engineered features guarantee the fastest, finest finish baking at lowest "per piece" production cost. Bring your finishing production facilities up to date by modernizing, now, with Fostoria Infra-red. Case histories of installations applicable to your production are available on request.

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In the sanding of welds, a flexible disc with a strong backing may be abrasive coated with a resin bond to perform jobs better than a rigid grinding wheel because of its flexibility. Thus, we have hide glue used on goods for dry, light, mechanized operations and hand sanding; a modified glue containing a special filler provides a denser, more heat-resistant agent for use on more severe, dry, mechanized operations.

Resin as the adhesive in the "Waterproof Cloth" produces an abrasive cloth for wet belt sanding, while resin, modified by a filler, stands up best in those applications generating intense heat and those requiring a tough bond. For floor sanding operations conducted by machinery, the drum or belt is coated with abrasives held in place by a combination of hide glue and resin, each modified by a filler. Such a product remains hard under the heat developed by these sanding machines.

Another improvement is flexibility of the coated abrasive sheet which can be varied to make the product adaptable to required operating conditions. It may be made flexible in the lengthwise direction or it may be made flexible in all directions. This flexing operation is concerned with breaking the bond bed. This is done in crosswise direction, or diagonally to the length of the material, and does not weaken the specific surface adhesion between the glue and abrasive.

Backing Developments

The third element in coated abrasives in addition to the adhesive and abrasive is the backing or the flexible sheet which carries the abrasive grains to the work. The backing of high tear and tensile strength paper may be of rope or wood fiber, made by both the fourdrinier and cylinder processes. The weights of paper used extend from 40 to 130 pounds. For paper backings used

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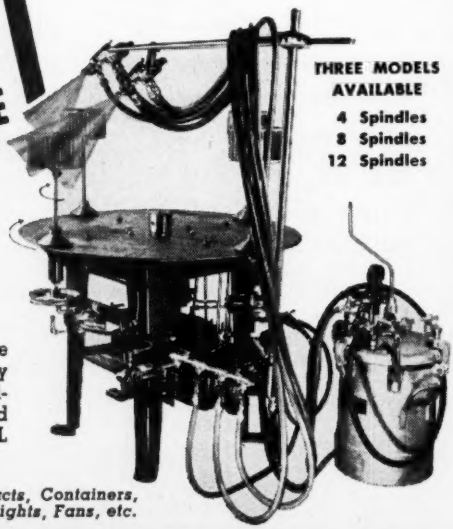

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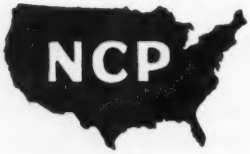

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with water-resistant adhesives a high wet strength is required, and this technical development by the paper industry is a distinct contribution to the coated abrasives industry. Where greater strength is required, as for instance in metal-working where there are heavy sanding jobs, the backing is cotton cloth woven with a twill weave of controlled construction. All cloth is shrunk and dried under tension, filled with starch-clay or other suitable material, and properly adjusted to give the adhesion and flexibility required for the final job to be performed by the coated products.

For heavy duty jobs the backing must be a fiber, often called vulcanized fiber, which is made of cellulose sheets laminated and treated with zinc chloride, washed, and dried. This is a strong flexible backing suitable for discs and belts. The use of fiber backing has made it possible for coated abrasives to find application for operations formerly performed with rigid abrasive wheels. The blue-gray vulcanized-fiber backing may be further reinforced with a drill cloth attached by hide glue. This type of backing is confined to disc applications on portable sanders where high speeds and severe strains are encountered.

Another combination is made from strong paper stock to which is attached a lightweight cloth. This backing has little stretch in use, and is preferred in the shoe trade.

Improved Coating Methods

Other improvements in the making of coated abrasives that coincided with the period of standardization include the process of open-coating by which the abrasive grains are widely separated on the sheet. This provides clearance so that the product is improved for such applications as removing old varnish from wood floors.

In the electric coating process, the abrasive grains fall on the glue-coated sheet through an electrostatic field. Because each grain becomes charged,

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WHIRL

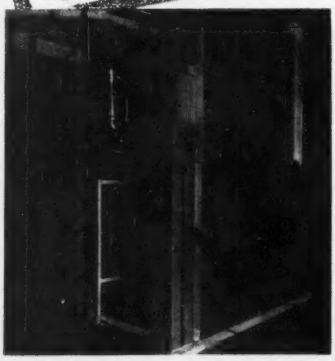
it coats up-ended or parallel to the major axis, and is therefore sharper in its abrasive action on the work. Likewise, since the particles are all equally charged, the sheet is uniformly coated.

All this progress coincided with simplification and standardization in the coated abrasives industry. It should be emphasized that abrasives may be flint, emery, garnet, silicon carbide, and electrically-fused alumina, that the grit sizes may be from 12 mesh to 600 mesh, that there may be a variety of paper backings, four cloth backings, and that all these possible combinations may be cut into innumerable lengths and widths. Standardization to avoid multiplication of items was in order, and it aided the industry in its continued progress for its many customers.

The automotive industry in its many applications of electroplating on last year's cars used 50 per cent of the chromium, nickel, and copper employed in the nation's consumption electrolytically, according to a report made to the American Electroplaters' Society. It also used almost half of the nation's consumption of zinc and cadmium in electrodeposited coatings. Much of the supply is now being diverted to the electroplating requirements of the defense program.

Electrolytic research has now made possible electro tinplate for use in food containers, one side of which is electroplated with tin to the requisite depth to ensure proper preservation of contents, while the outside is plated with a lighter coating. This development, the American Electroplaters' Society reports, is a big step forward in conserving the nation's tin supply for defense needs.

LANLY'S Compact Economy OVEN



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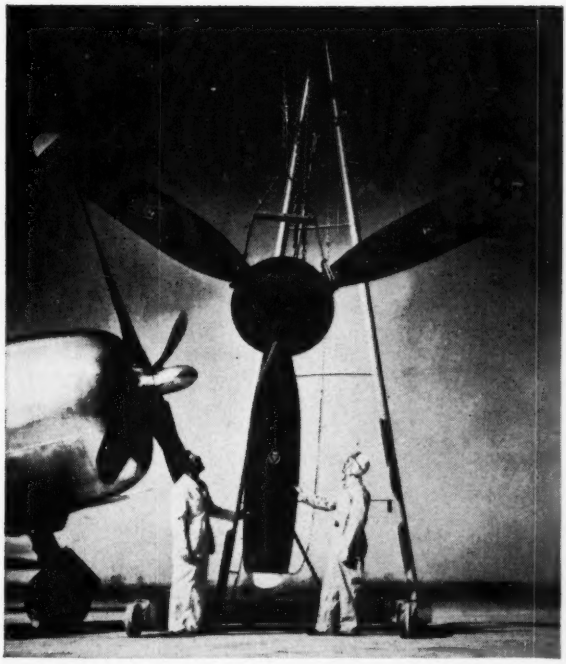

THE CONVAIR B-36 *and the RB-36 (shown above) have six Curtiss propellers, like the one at the left, which is the world's largest production model.*

THE MACHINE. *This drill press, equipped with air operated ram and timer, provides the power and automatic operation for brushing the hub bearing. This machine and accessories were on hand, making it possible to get into production in a hurry.*

What's this 3-bladed approach to speed defense production?

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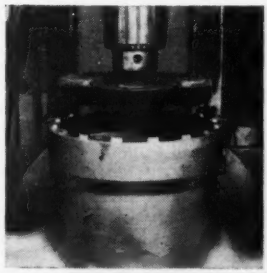
The Propeller Division of the Curtiss-Wright Corporation had a problem. It had to clean and finish a shot-peened bearing area inside the hubs of its propellers. It appeared this vital operation would require large, elaborate equipment, costly jigs and considerable time getting into production.

Then, with the help of their **O**sborn **B**rushing **A**nalyst, a method was worked out to do it with power brushing. By mounting an Osborn Monitor Brush on a simple drill press adapted for the job, they are getting excellent finishes at high speed.

This is another example how Osborn power brushing can help simplify and speed production jobs. Your **O**sborn **B**rushing **A**nalyst will gladly assist on any defense tooling-up problems involving product cleaning or finishing. *Write Dept.470, The Osborn Manufacturing Company, 5401 Hamilton Avenue, Cleveland 14, Ohio.*



THE BRUSH. *This Osborn Monitor Brush, rotating at 900 r.p.m., feeds into the hub, removes loose particles and smoothes the surface of the shot-peened bearing area (and cleans the threads shown at the top of the hub). Various diameters of brushes are used to suit the hub sizes.*

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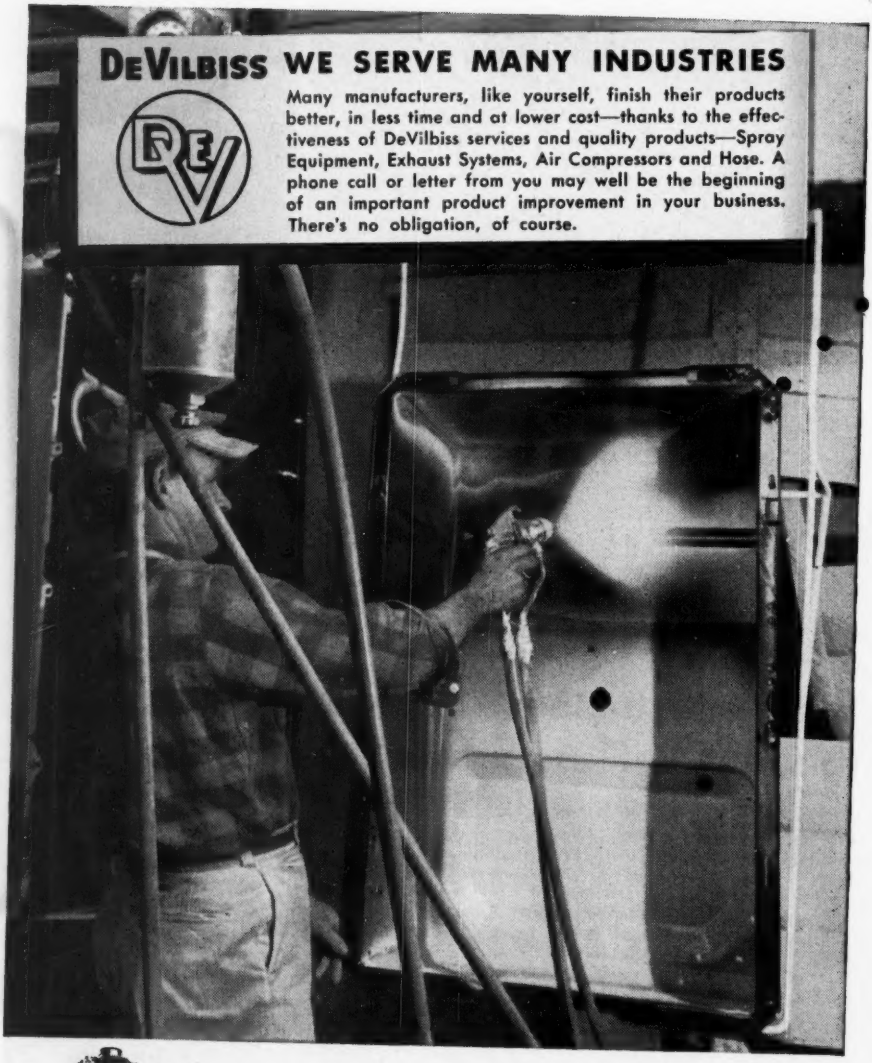
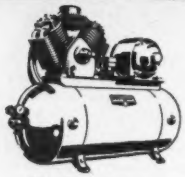
Many manufacturers, like yourself, finish their products better, in less time and at lower cost—thanks to the effectiveness of DeVilbiss services and quality products—Spray Equipment, Exhaust Systems, Air Compressors and Hose. A phone call or letter from you may well be the beginning of an important product improvement in your business. There's no obligation, of course.





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- The new guns enabled him to operate at pressures as low as 40 lbs.—a tremendous saving in air consumption.

Whatever your finishing job, DeVilbiss service and precision-built products—Spray Equipment, Exhaust Systems, Air Compressors and Hose—can do much to save manhours, cut costs and improve the quality of your products.

Your inquiry to our nearest branch office, or direct to the factory, will bring you prompt information.

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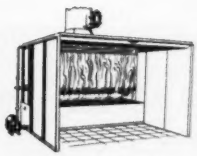

Spray Booths

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Aircraft Finish Demonstrates Durability

By GILBERT C. CLOSE

A GOOD illustration of military aircraft finish durability, when applied according to Government Specification, occurred recently when a wing flap which had broken loose and fallen into the Pacific Ocean during a test flight five years ago, was fished from the water and found to be still in very good condition. The flap tore loose from a Douglas experimental TB2D dive bomber in 1945. Just recently, it was washed onto the beach and recovered near Redondo Beach, California.

Shown examining the recovered flap are Elmer Mitchell (left), Douglas process finish technician, Adrian Bibee (center), Douglas process metallurgist, and Pilot Laverne Browne who was flying the airplane at the time of the incident. *(Photo courtesy Douglas Aircraft Company, El Segundo, California)*

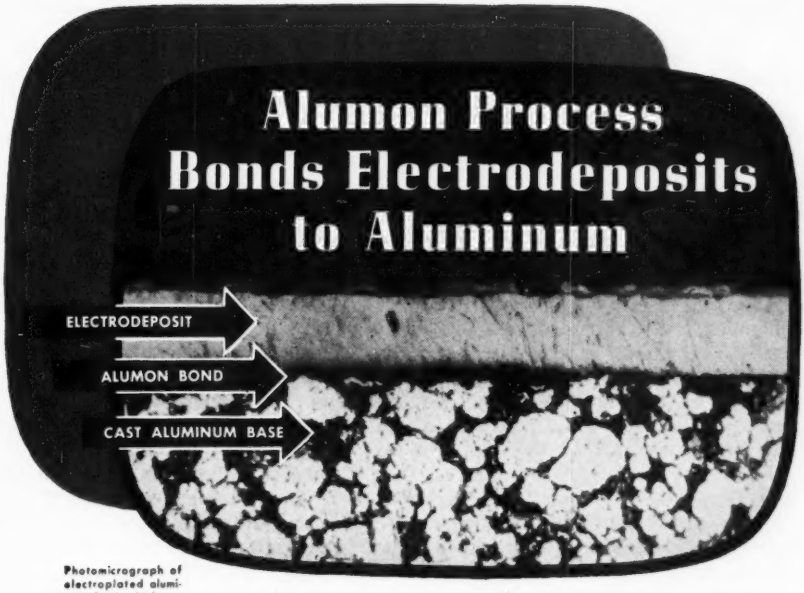
According to Adrian Bibee, Douglas process metallurgist who examined the flap, the metallurgical condition of the metal was still excellent. Some cadmium plated screws had suffered slight corrosion, and there was some galvanic corrosion at bi-metal contact areas, but in general the finish system had not failed, even in areas where the flap had been severely dented during its fall.

The original finish on the flap, which is constructed principally of 24ST Alclad aluminum sheet, consisted of anodic treatment in a chromic acid bath, a coating of zinc chromate primer conforming to Specification AN-P-656, and a top coat of AN-L-29 sky-blue lacquer.

In no area had the finish system failed sufficiently to permit corrosion of the underlying metal. This, despite the fact that salt water is considered a highly corrosive medium for aluminum.

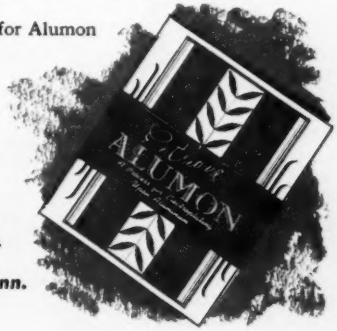
●

Alumon Process Bonds Electrodeposits to Aluminum



Photomicrograph of electroplated aluminum showing high tensile Alumon Bond

Hundreds of manufacturers throughout the United States are now using electroplated aluminum. The Alumon process is simple. The work is merely cleaned, dipped in acid, dipped in Alumon and is then ready for electroplating with copper, nickel, and other metals. The process is suitable for plating most wrought and cast alloys . . . The cost of using alumon is low, being less than half a cent per square foot of surface area treated. The process can be fitted easily into regular plating cycles. Write today for Alumon Process bulletin and technical data on how you can use electroplated aluminum for your products.



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A Method for Disposal of Acid and Alkaline Plating Room Wastes

By DR. J. H. MONAWECK and CLYDE KELLY
Prepared for the Chicago Electroplaters' Institute

ONE method for the disposal of acid-alkali wastes is to mix the acids and alkalies together before discharging to the sewer. The quantities of each material must be so proportioned that the pH of the discharge to the sewer is held between pH 4.8 and 9.2.

To accomplish the mixing of acids and alkalies, a rubber-lined tank, 20 per cent larger than the combined amount of acids and alkalies mixed at one time, must be provided. This tank should be equipped with a stirring apparatus and stainless steel heating coils. Stirring of the mixture is required to keep cleaner sludge in suspension during treatment. Heating the mixture keeps soap grease emulsions in solution and hastens the reaction between acids and alkalies, thus minimizing the time of mixing and pH adjustment.

To initiate the disposal operation, cleaners from the various tanks of pH 10.1 to 13.0 are pumped into the storage tank. The cleaner may be either hot or cold. The pumping operation should be such that much of the sludge is pumped into the treating tank. The stirrer is started and the acids are pumped into the stirred cleaner. Some heat will be generated by the reaction, but the hot-

TABLE I

APPROXIMATE AMOUNTS OF VARIOUS ACIDS NECESSARY TO REDUCE THE pH OF ONE GALLON OF CLEANER TO 9.2

	Gallons of 10% muriatic acid by volume to neutralize one gallon of cleaner	Gallons of 10% sulfuric acid by volume to neutralize one gallon of cleaner	Gallons of 10% nitric acid by volume to neutralize one gallon of cleaner
Steel cleaner 8 oz./gal.	0.55	0.15	0.37
Brass cleaner 8 oz./gal.	0.32	0.09	0.22
Aluminum cleaner 8 oz./gal.	0.45	0.12	0.30

TABLE II

APPROXIMATE AMOUNTS OF VARIOUS ACIDS NECESSARY TO REDUCE THE pH OF ONE GALLON OF CLEANER TO 4.8

Steel cleaner 8 oz./gal.	0.87	0.24	0.59
Brass cleaner 8 oz./gal.	0.48	0.13	0.32
Aluminum cleaner 8 oz./gal.	0.50	0.14	0.34

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ter the reacting materials, the faster the pH of the cleaners will be reduced. If insufficient acid is dumped to neutralize the cleaner from pH 13 or 10.1 to pH 9.2, sulfuric acid diluted 1 to 1 with water should be added until the pH of the mixture in the storage tank is adjusted to 9.2 or less. If there is too much acid being dumped for the amount of cleaner in the mixing tank, that is, the pH of the mixture is below 4.8, finely divided solid sodium carbonate should be added until the pH of the mixture has been raised to 4.8. After adjusting the pH of the mixture to 4.8-9.2, the acid-alkali mixture should be stirred for 15 to 30 minutes. Another pH reading is taken, and if the pH of the mixture is still between the prescribed limits, the contents of the mixing tank can be dumped to the sewer. The pH of the solution can be determined by pH papers or the usual pH apparatus. The approximate amounts of acids to neutralize the average cleaners are given in Tables I and II. These amounts are computed for an average cleaner, as presented in a report on Project 12, A.E.S. Research.

In computing the equivalents of acid dips and cleaners it must be remembered that cleaners can vary as much as 100 per cent in the concentration of their various ingredients.

If the above method is not operable, a less satisfactory way of acid-alkali waste disposal is to merely pump the acids or alkalies into a storage tank and allow to dribble to the sewer along with the rinse water during shop working hours.

If no storage tank is available, cleaners and acid dips should be dumped simultaneously.

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PEELABLE SPRAY-BOOTH COATING

Using expensive labor to scrape down spray-booths costs a lot more than peeling off accumulated overspray in big sheets. Safer, too. Order a 5-gallon Test-Sample at Drum Lot price.

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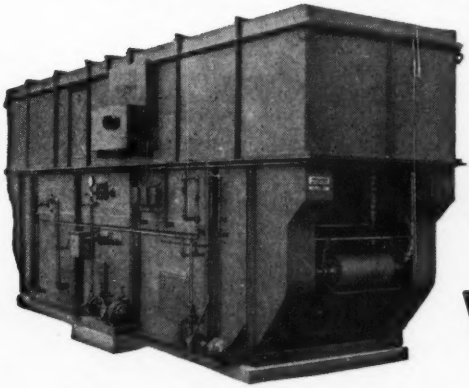

You can save *dollars* on your cleaning operations by installing an OPTIMUS Vapor Degreaser in your production line. With its use metal parts cleaning is speeded up and made more efficient. Grease, oil and dirt are quickly and effectively removed from the parts by the vapors of the solvent. Chips, insoluble impurities, buffing compounds and stubborn dirt are completely removed with clean solvent flushing. Maintenance and operation costs are at a minimum. Solvent is distilled and reclaimed *automatically*.

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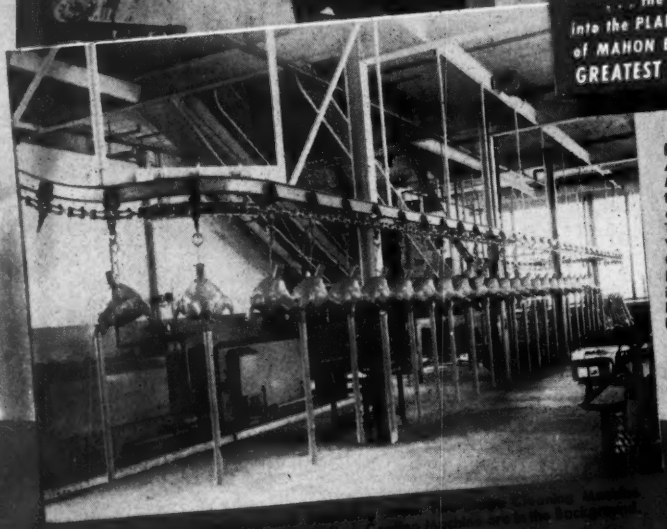

Illustration Above Shows Compact Arrangement of a Complete Mahon Finishing System Designed to Handle Finishing Production in a Comparatively Small Plant. Two-Stage Cleaning Machine is Visible at Left. A Two-Color Flow-Coating Machine is Barely Visible Behind Ramps to Drying and Baking Oven which is Located on the Roof Directly Above. Loading and Unloading Line is in the Foreground.

M

E

Finishing SYSTEMS

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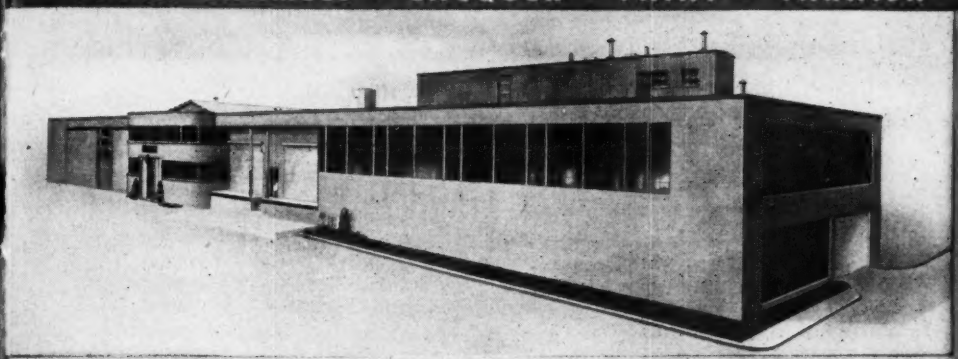

Ultramodern Plant of the Danuser Machine Company, Fulton, Missouri. Note Finish Baking Oven of a Complete Modern Finishing System is Located on the Roof.

Small Plant Operators, Too, CUT FINISHING COSTS with MODERN MAHON EQUIPMENT!

While the Mahon Nameplate appears on Finishing Equipment in almost every large automobile plant, household appliance plant, farm implement plant, road building equipment plant, and other large production plants in many industries throughout the country, it is singularly significant that so many comparatively small companies also pay a little more for modern Mahon equipment. The Danuser Machine Company, Fulton, Missouri, manufacturers of EARTH MOVING EQUIPMENT and FARM TOOLS, is a typical example. This company operates a Complete Mahon Finishing System specially designed to meet its specific production requirements . . . the completely conveyorized system consists of a two-stage Cleaning Machine, Dry-Off Oven, a two-color Flow-Coating Machine, and a Finish Baking Oven—the latter being an outdoor oven installed on the roof to conserve space within the plant. The owner of this plant is one of many small plant operators who have found that their finishing equipment requirements will receive from Mahon the same careful preliminary study, the same experience-backed planning and engineering that goes into finishing systems installed for the largest companies in the world—some of which run into millions of dollars. If you are contemplating new equipment, do not hestitate to call in Mahon engineers . . . you will benefit from a wealth of technical knowledge and practical know-how not available to you elsewhere. See Mahon's Insert in Sweet's Mechanical Industries File for complete information, or write for Catalog A-650.

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AHON

Automatic Spray Finishing of Aluminum Siding

By RICHARD H. NAPPI
President, Industrial Finishing Company

DURING recent years, increased interest has been shown in the application of aluminum siding, suitably finished in baked enamel, to improve the appearance and durability of frame houses. The "before-and-after" view shown in Fig. 1 illustrates the increased attractiveness of the "aluminum-clad" house.

The Industrial Finishing Company, a Long Island City, New York job finishing plant, recently designed special fa-

Fig. 1—A "before-and-after" view of a house showing the improvement in appearance gained through the application of aluminum siding.

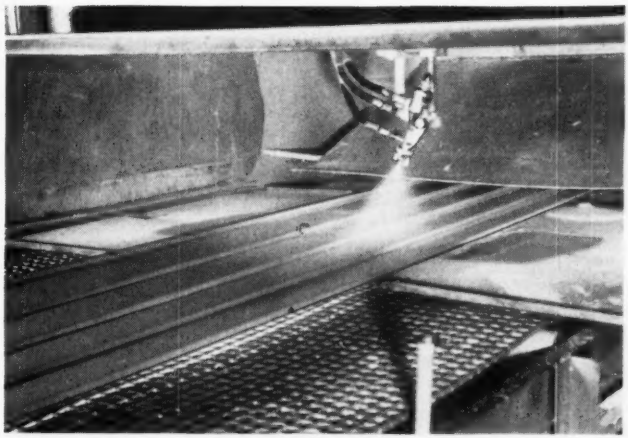

Fig. 3 — Illustration shows automatic spraying of aluminum house siding panels on metal belt conveyor. Note pans placed at each side of the aluminum panel to protect the metal belt from paint overspray.

cilities and installed automatic spray equipment to spray-coat aluminum siding efficiently and economically. The aluminum sheets to be coated and used as house siding are approximately 26 inches wide and from 8 to 12 feet long. They are formed to simulate the appearance of wood siding, each sheet presenting the appearance of either 4 or 6 wood siding sections.

In designing and specifying finishing equipment and materials, it was necessary to keep in mind the conditions under which the finished product would be used, the required coverage and gloss properties of the enamel finish, as well as the normal problems of production requirements, baking schedules, handling, and packaging. After exhaustive tests, a white urea formaldehyde synthetic enamel, containing 69.5 per cent solids and exhibiting a gloss reading of 13 on the baked film, was selected. Enamels of higher gloss readings appeared to produce objectionable glare. To withstand the abrasive action of wind, rain, sleet, and snow, enamel film thickness of 1.5 millimeters was specified.

Panels are received from the aluminum fabricator formed and roller coated with zinc chromate primer.

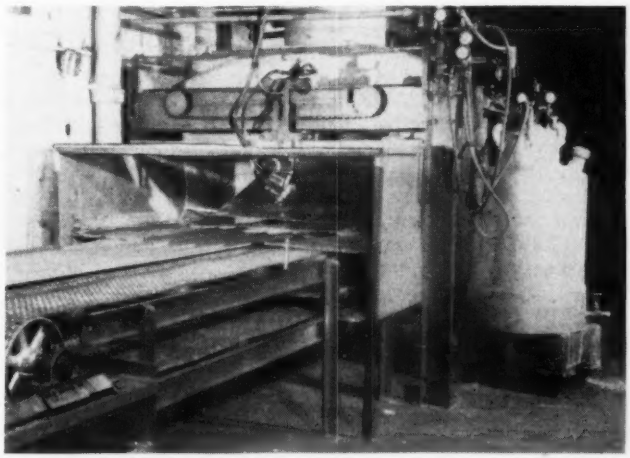

Fig. 2—A view of the Binks automatic spray painting installation in the plant of Industrial Finishing Company. Above the spray booth can be seen a small exhaust system to remove any objectionable fumes resulting from the spraying operation.

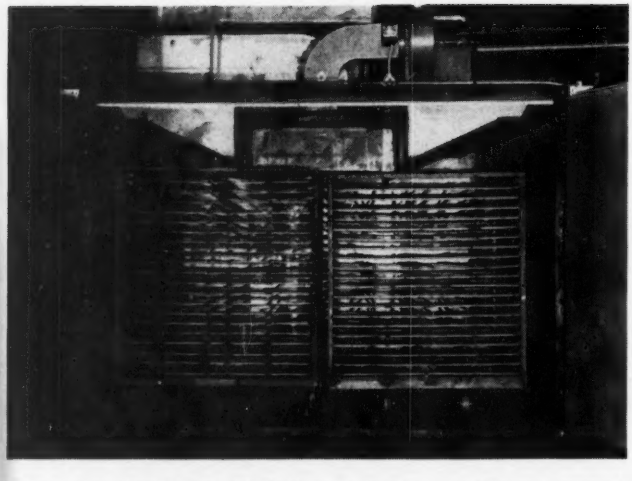

Fig. 4 — A view of the Gehnrich circulating type gas-fired oven used to bake the enameled panels. Two truck loads of sprayed panels are shown in position in the oven. The oven is fitted with large swinging doors at each end so that trucks may be loaded from one end and removed from the other to simplify processing. *(All photos courtesy Industrial Finishing Co., Long Island City, N. Y.)*

After a preliminary dusting with tack rags, the panels are ready for application of the final finish.

The enamel finish is sprayed on the aluminum panels as they travel on the power-driven, 20-foot long metal conveyor by means of Binks automatic spray equipment, a view of which is shown in Fig. 2. The spray gun, a close-up view of which is shown in Fig. 3, travels back and forth at right angles to the direction of travel of the panels, applying a uniform enamel film. The speed of travel of the spray gun, the width of enamel spray (normally 14 inches), and the speed of the metal conveyor are all adjustable. Film thickness of the finish is controlled at the desired value by the proper combination of spray gun fluid regulator adjustment, fluid and air pressure settings at the enamel storage tank, and relative speeds of the metal conveyor and the reciprocating spray gun.

A uniform enamel viscosity is maintained by periodic tests with a General Electric Viscosimeter. Enamel is stored and fed to the spray gun from the Eclipse 50-gallon pressure tank, shown at the right in Fig. 2. While in the pressure tank, the enamel is stirred continually by an air-driven agitator.

Sprayed panels are unloaded from the discharge end of the automatic spray conveyor onto large transport racks or trucks. When two of the trucks have been loaded with sprayed panels, they are rolled into a Gehnrich direct gas-fired, circulating-type oven (see Fig. 4). The enameled panels are baked at 300 deg. F. Automatic temperature controls keep temperature variation below 4 deg. F. throughout the oven.

After baking, panels are allowed to cool and are then unloaded directly from the trucks and packed for shipment. The system is so timed that the operations of spraying, baking, and packing of two trucks full of panels, each require equal amounts of time; thus, production flows smoothly. Through the use of the equipment described, 20,000 square feet of aluminum siding may be sprayed, baked, and packed in an eight-hour day.

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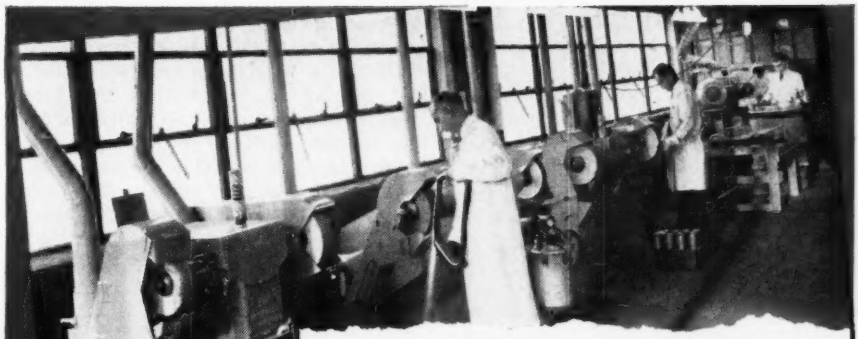
IRON and steel articles are frequently protected again corrosion by apply-



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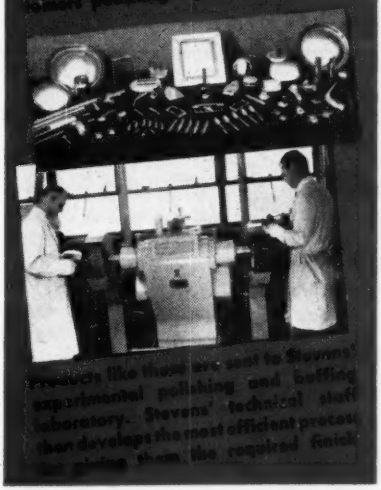

Products like these are sent to Stevens' experimental polishing and buffing laboratory. Stevens' technical staff then develops the most efficient process for giving them the required finish.

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Let us help you find new polishing and buffing profits with Stevens methods and materials. Our staff can show you many ways to cut costs *and* improve your finished product—without obligation. Either call on your nearby Stevens representative or write direct to Frederic B. Stevens, Inc., Detroit 16, Michigan.

METAL FINISHING EQUIPMENT AND SUPPLIES SINCE 1883

FREDERIC B. STEVENS INCORPORATED

DETROIT 16, MICHIGAN

ing a phosphate coating, more particularly a zinc phosphate coating. This may be done by treating the article to be coated with a warm solution of zinc oxide and phosphoric acid in water. A ferrous article, however, in contact with phosphoric acid, will shortly react with that acid to give rise to formation of ferrous phosphate with simultaneous liberation of hydrogen. As the coating bath is preferably kept close to pH 3, the ferrous phosphate will remain in solution, unless oxidized to ferric phosphate, which, being insolable above approximately pH 2, will precipitate out and can then be removed with the sludge or by filtration. Interference of soluble ferrous phosphate with the desired zinc phosphate coating can be prevented without introduction of foreign ions into the bath by hydrogen peroxide oxidation of the ferrous to ferric phosphate.

The amount of hydrogen peroxide to be used is rather critical and depends on the particular treating bath used. Satisfactory coatings require a phosphoric acid solution with a zinc content of about 0.25 per cent and not under 0.1 per cent nor over 0.5 per cent with hydrogen peroxide present in the solution in amounts between 0.004 per cent and 0.024 per cent, and further containing enough sodium hydroxide to obtain a pH of about 3, the treatment being carried out at below 130 deg. Fahrenheit.

—(U. S. Patent 2,326,309, G. C. Romig)

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How a Pittsburgh Brush Solved an Oil Pressure Problem*

**An actual case history from the Allis-Chalmers Pittsburgh Works, manufacturers of Transformer Radiators.*

AT ALLIS-CHALMERS, well-known manufacturer of industrial equipment, the problem was to secure a satisfactory oil pressure test on transformer radiators. The key to the problem was to find a brush narrow enough to clean between cooling fins and strong enough to remove slag and spall on welds which could conceal pinholes. Pittsburgh engineers recommended an 8" rotary wire brush. The brush proved more than satisfactory and the problem was solved!

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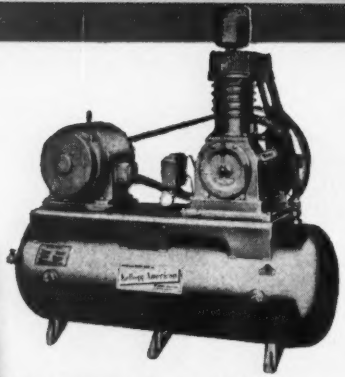

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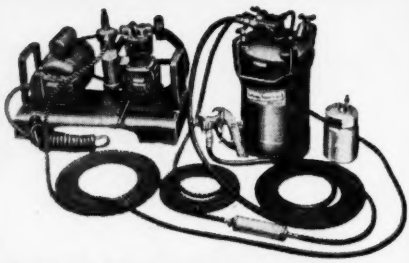

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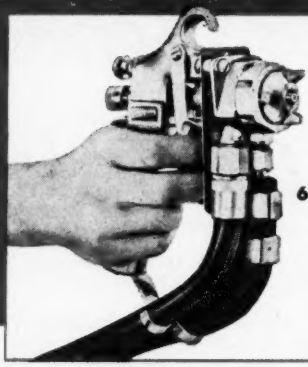

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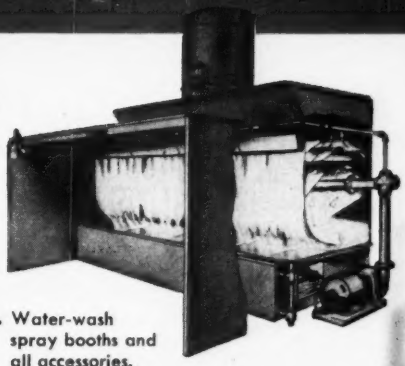

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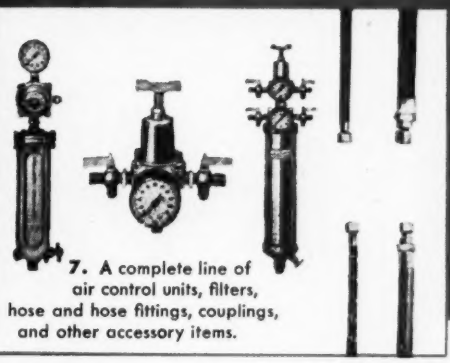

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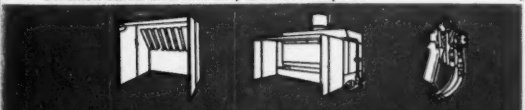

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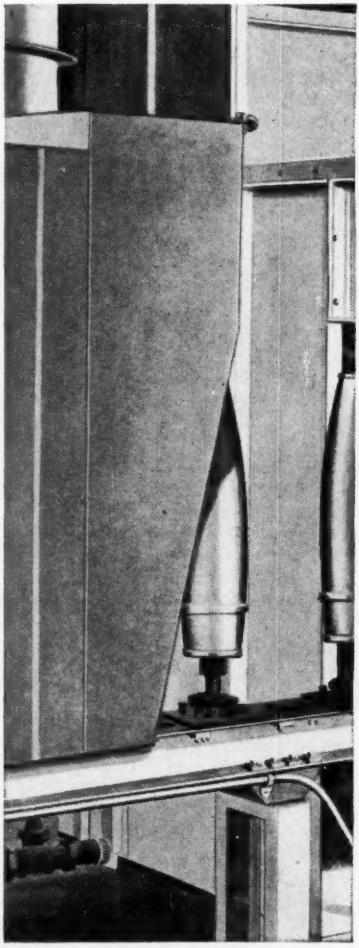

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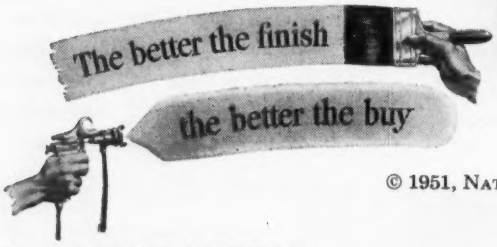

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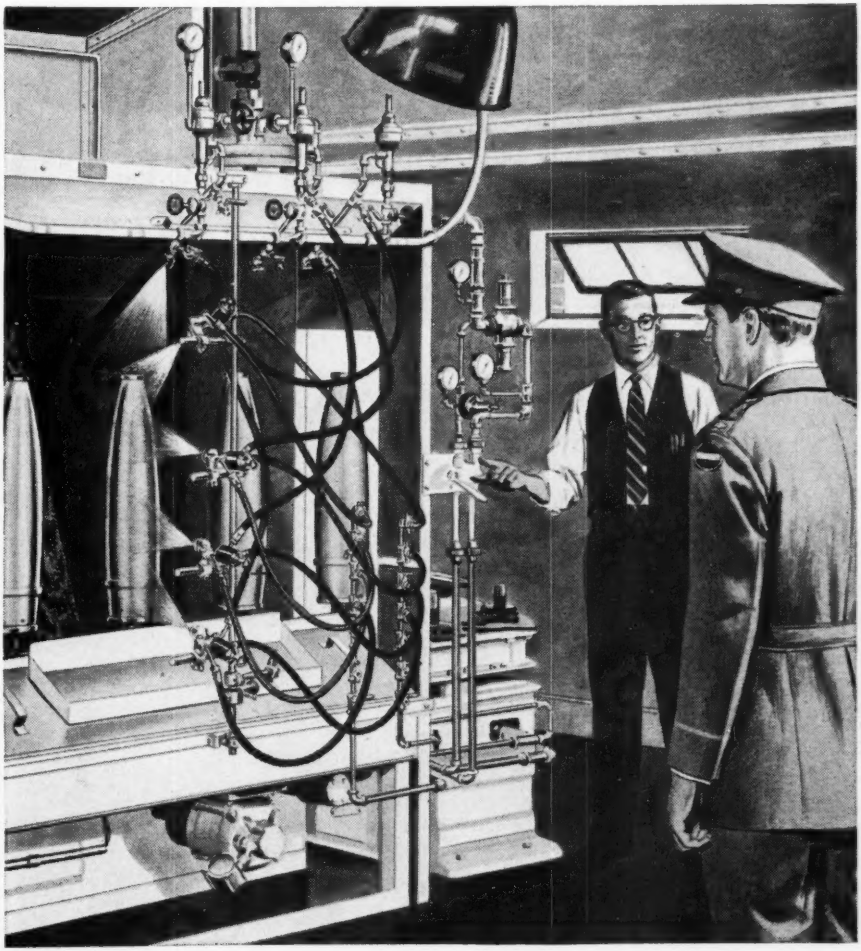

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Spotlighting FINISHING Progress

A Monthly Digest of Current Technical Progress Indicating Significant Trends and Developments in the Finishing Industry

By DR. ELLEN G. GRAY

Cleaning and Etching of Aluminum Alloys

AN OUTSTANDING feature of the recent 98th meeting of the Electrochemical Society was a symposium sponsored by the Society's Electrodeposition Division in which were discussed new developments in conditioning and treatment of metal surfaces for plating and other finishing operations.

In discussing surface conditioning of aluminum alloys before the Symposium, Dr. Walter R. Meyer, Enthone, Inc., stated that the treatment of these alloys to obtain chemically clean, active surfaces is made difficult by the chemical reactivity of aluminum and by the presence of other metals in the alloy, such as silicon, copper, manganese, magnesium, chromium, nickel, lead, zinc, and bismuth. These metals not only influence the rate of attack of acids and alkalies on aluminum alloys, but are left behind on the surface of the metal, and if they are not removed, they can cause poor adhesion of electrodeposits and organic coatings, and can interfere with welding.

Cleaning materials used for cleaning aluminum alloys include organic cleaners, alkali cleaners, and acid cleaners. Alkali cleaners may be of two types, etching and non-etching. Aluminum reacts noticeably at a pH of 8, and as the pH increases, more rapid attack occurs. Figure 1 shows the effect of temperature on the rate of solution of aluminum in caustic. Hot

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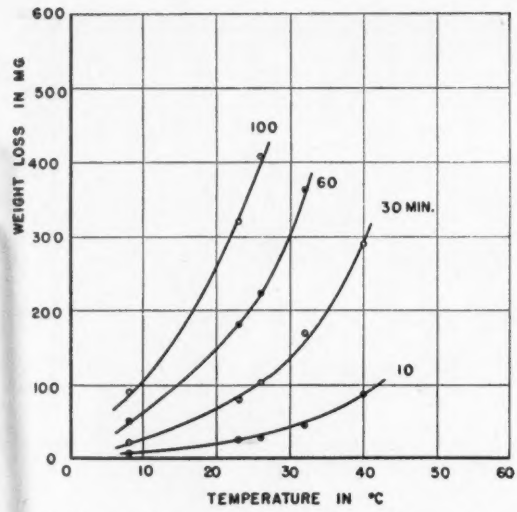

Fig. 1—The effect of temperature on weight loss of aluminum in 0.20 sodium hydroxide solution. (*Data based on work conducted by M. A. Streicher at Lehigh University.*)

solutions of strong alkalies, such as sodium hydroxide, rapidly remove any oxide films that may be present on the surface. Milder alkalies frequently used for etch cleaning include sodium carbonate and trisodium phosphate. It is wrong to assume that because these alkalies act at a slower rate on aluminum the resulting finish is finer. Actually, finer etches are produced with the more strongly alkaline solutions, and coarser etched surfaces are produced with milder alkalies.

Dr. Meyer emphasized the importance of proper solvent precleaning of aluminum parts prior to etching to avoid the danger of developing an "etch pattern" that cannot be removed readily by subsequent operations. Such etch patterns can result from oil liberation (during etching operations) from crevices or holes in work that has not been properly degreased. Vapor degreasing, according to Dr. Meyer, is one satisfactory method of preparing aluminum for many finishing operations. It is also employed in precleaning prior to alkali cleaning in plating cycles. Experience has shown that if an aluminum part, which has its surface contaminated with heavy oil or grease, is immersed in a hot alkali cleaner, there is a good chance that an etch pattern may be developed due to the fact that uniform removal of the grease film may not be accomplished, and the deeper etching will occur in the regions where the oil is first removed.

Another important point in conditioning aluminum alloys concerns the removal of smut remaining on the surface after etching. This is not easy if the alloy contains silicon. All of the metals normally present in the smut will be removed by combinations of nitric and hydrofluoric acids. However, this cannot be done by dipping the alloy first in nitric acid and then in hydrofluoric acid. While the nitric acid will remove all metals but silicon, according to Dr. Meyer, when the alloy is dipped in a hydrofluoric acid solution to remove silicon, further etching of the base aluminum occurs to re-form copper smut. As a result, combinations of nitric and hydrofluoric acids are required to give completely clean surfaces on alloys that contain silicon. The ratios of these acids can vary considerably. A commonly used mixture which was recommended is composed of three volumes of nitric acid and one volume of 48-52 per cent hydrofluoric acid.

Non-etch cleaners for aluminum contain alkalies such as sodium carbonate, trisodium phosphate, complex phosphates, sodium hydroxide, sodium metasilicate and wetting agents, together with an inhibitor, to prevent attack on the aluminum. The inhibitor

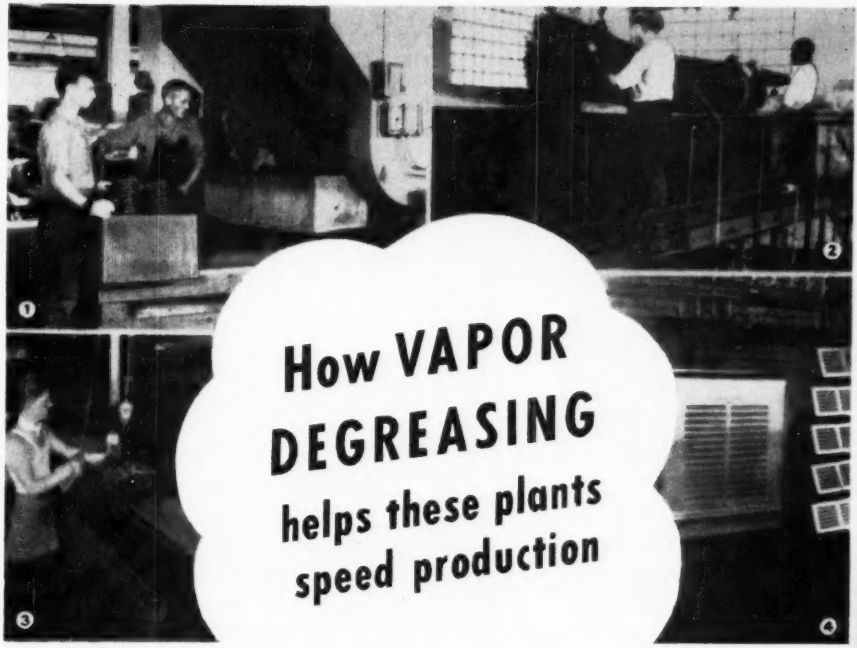

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TABLE I

DATA PRESENTED BY DR. WALTER R. MEYER TO SHOW THE INHIBITING ACTION ON ALUMINUM OF VARIOUS CONCENTRATIONS OF SODIUM SILICATE ADDED TO CAUSTIC SODA.

Conc. of NaOH grams per liter	Additions of Silicate grams per liter	Wt. loss mg/dm²/day
5	0	87,000
5	3	187
5	7	95
15	0	177,000
15	4	175,000
15	10	900
15	20	93
30	0	318,000
30	10	280,000
30	20	2,600
30	30	Slight gain in wt.*
30	40	Slight gain in wt.*
60	0	640,000
60	25	450,000
60	35	Slight gain in wt.*

* These panels gained in weight because there was a film of silica that deposited on the panels that could not be brushed off with the soft brush that was used.

may reduce the overall cleaning efficiency because of film formation; therefore, if oily work is to be treated without etching, an acceptable solvent precleaning method should be used before the non-etch cleaner.

With regard to sodium hydroxide solutions the most effective inhibitors are the silicates in which the mole ratio of SiO_2 to Na_2O is two to one or greater. Best practice, according to Dr. Meyer is to use just as little of the silicate as is necessary to prevent attack of the aluminum. The amount of silicate that is needed depends upon the operating temperature and the concentration of sodium hydroxide in the solution. Dr. Meyer presented data (Table I) to show the inhibiting action of a sodium silicate (with a weight ratio of alkali to silica of 1 to 3.22) added to various concentrations of sodium hydroxide. These tests were made by immersing 2 x 3-inch panels of 2S 1/2H aluminum on glass rods in 800 ml. of the solution at 180 deg. F. Tests with 5 and 15 gm./l. of sodium hydroxide were run for five minutes. Prior to immersion the parts were cleaned with 2 per cent sodium hydroxide, washed and brushed to remove smut, dried, and reweighed.

Dr. Meyer recommended that addition of silicate be made so that the weight ratio (mole ratio is almost the same) of Na_2O to SiO_2 is not greater than 1.5 to 1. Actually, he stated that it is better that a ratio of 1 to 1 not be exceeded, particularly if cast alloys are to be treated, since they are usually more susceptible to attack by alkali than purer aluminum alloys.

With reference to acid cleaners, Dr. Meyer stated that phosphoric acid cleaners are used to condition aluminum surfaces prior to organic finishing. These cleaners are composed of phosphoric acid together with a material such as butyl alcohol, propyl alcohol, or ethylene glycol ethers which

to page 62→

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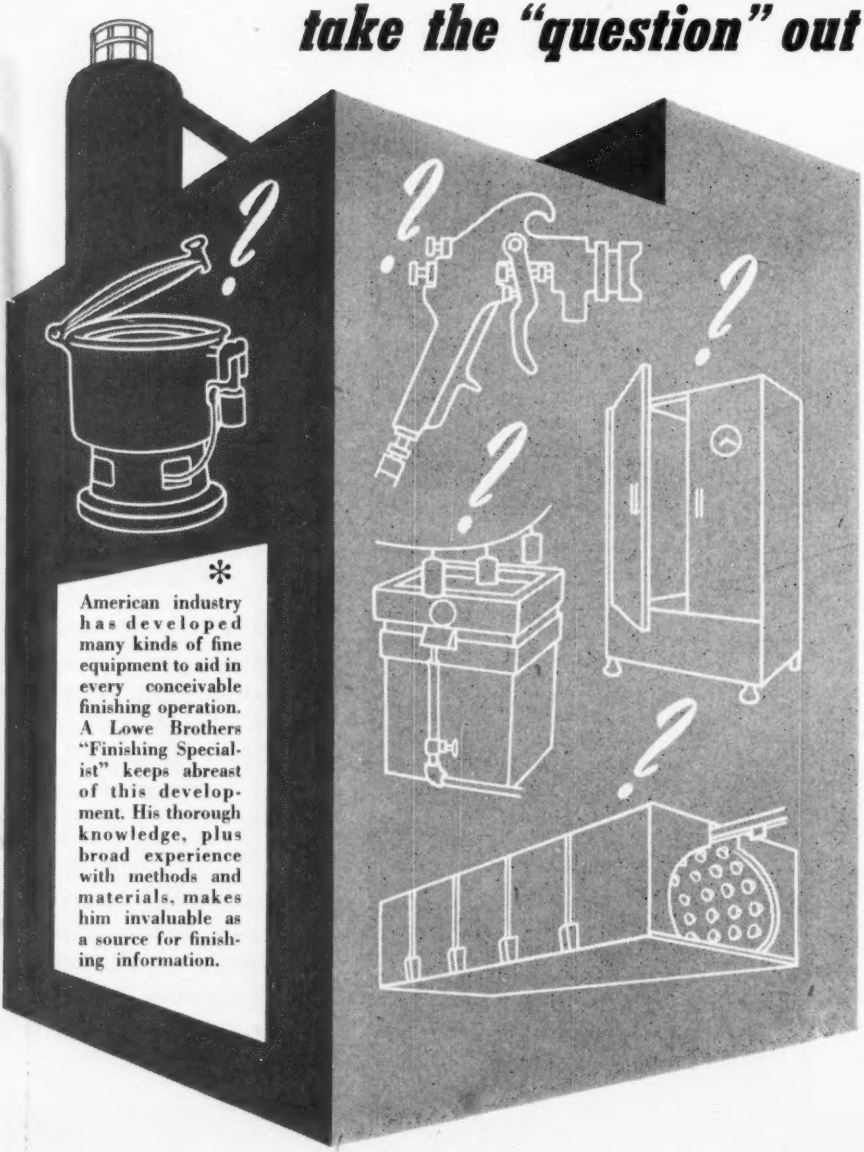

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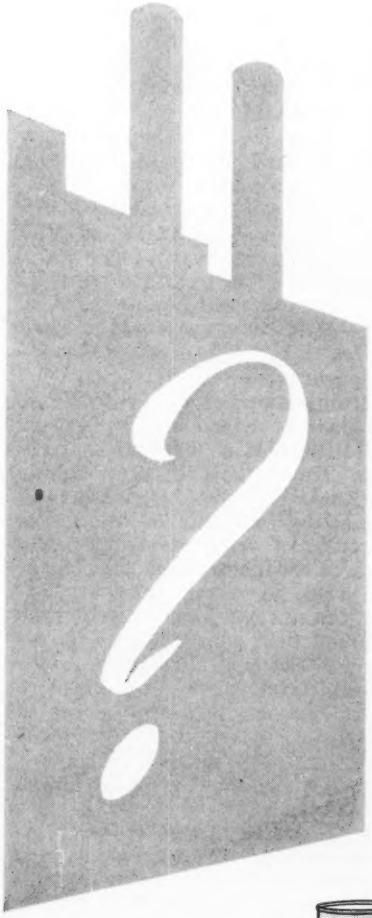

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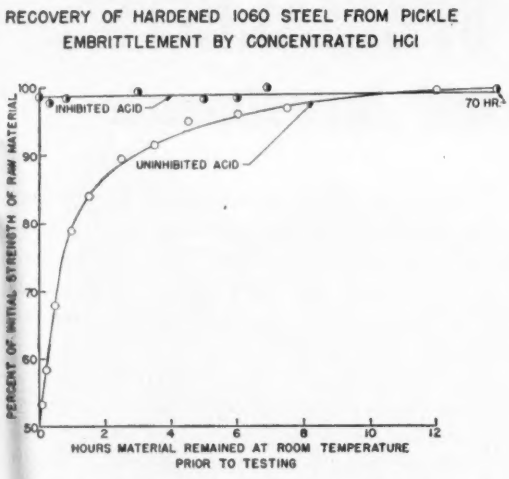

Figure 2
(Based on data presented by Prof. R. C. Weast, Case Institute of Technology, before the 98th Meeting of the Electrochemical Society.)

assist in dislodging oil films. According to Dr. Meyer the rate of attack of orthophosphoric acid on aluminum is low, being about one-tenth that of solutions of hydrochloric acid and one-hundredth the rate of hydrofluoric acid solutions. As a result phosphoric acid removes corrosion products from the surface but does not strongly attack the aluminum surface to produce a smut that would interfere with good adhesion of the organic coating. This type of cleaner is particularly valuable for treating large objects that cannot be immersed in the cleaning solution.

* * *

Hydrogen Embrittlement of Plated S.A.E. 1060 Steel

THE results of research which was directed toward the elimination of hydrogen embrittlement from strips of cadmium plated S.A.E. 1060 steel which had previously been heated, oil quenched and drawn to a hardness of 45-47 Rockwell C were discussed before the Symposium by Professor Robert C. Weast, Case Institute of Technology, Cleveland. The method employed for determining the extent of brittleness was to bend strips of the metal at a constant speed around a $\frac{1}{16}$-inch diameter pin, noting the angle at which a crack first appeared in the steel. The samples used by Prof. Weast in his study were $\frac{1}{16}$-inch thick, $\frac{1}{2}$-inch wide and 3 inches long. Some samples were plated in still baths, whereas others were plated in rotating barrels. Conventional baths, current densities, and times were used in most instances in order to produce the desired bright plate.

The initial studies by Prof. Weast were aimed at determining the extent of embrittlement of the steel as a result of pickling alone. The experimental data obtained showed that the inhibitor was effective in decreasing the extent of embrittlement of the steel, even though the steel was pickled for a period up to ten times that required for surface preparation. It was also found that the pickled metal recovered 99 per cent of its initial bending ability after storage for 10 hours at room temperature. The curves in Fig. 2 show the rate of embrittlement recovery of steel pickled in concentrated hydrochloric acid when allowed to remain at room temperature.

Even under the rather severe pickling conditions used in the study, the hydrogen did not stress the metal sufficiently to alter permanently its bending ability. Prof. Weast pointed out that with the steel used in his investigation no permanent effects of the bend strength of the steel were observed from acid pickling. The steel could always be returned to its original bend

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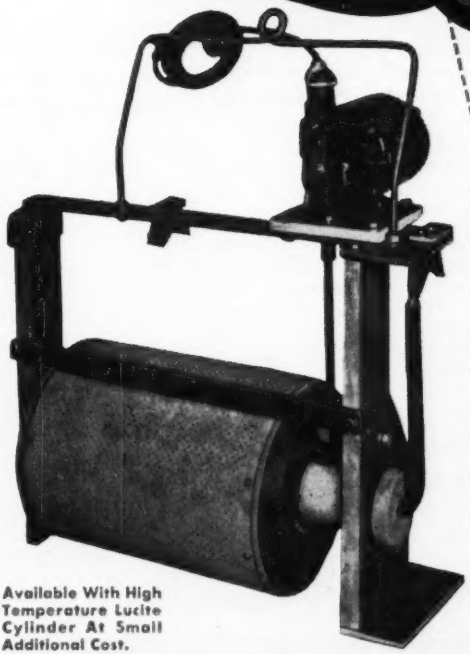

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strength by employing a proper time and temperature relationship. However, Prof. Weast emphasized that this return of the steel to its original bend strength does not mean that all of the hydrogen has been removed from the steel. All that it implies is that the metal has not been internally stressed beyond its elastic limit and that after some definite time the residual hydrogen in the steel is below a critical value.

The results of studies on the effect of temperature on the rate of recovery of S.A.E. 1060 steel from pickle brittleness resulting from five minutes' treatment in a bath of concentrated hydrochloric acid are shown in Fig. 3. The general shape of the recovery curves is the same as that obtained by many others working in this field. Recovery was essentially complete after 1½ hours' baking at 392 deg. F. or after baking at 212 deg. F. for 3½ hours or after storage at 77 deg. F. for 10 hours. One practical difficulty of the heat treatment procedures is the formation of a thin oxide film on the metal surface which must be removed before the steel can be successfully electroplated.

Further work was conducted to determine the effect produced by cadmium plating samples of the hardened 1060 steel surface finished by tumbling and also by acid pickling. These data are summarized in Table II showing the effect of bend tests conducted 24 hours after plating. The specimens which were tumbled and plated gave about the same 24-hour recovery characteristics as the tumbled and acid pickled pieces. However, the data obtained showed that if the steel was acid pickled and then plated shortly thereafter, it was quite brittle after 24 hours at room temperature. If, however, the pickled metal was stored for a sufficient time to remove the pickle brittleness and then plated and then stored again, the resulting plated product was not brittle.

The results of studies conducted by Prof. Weast to determine the effect of temperature on the recovery of pickled and cadmium plated 1060 steel are shown in Fig.

TABLE II

DATA PRESENTED BY PROF. R. C. WEAST BEFORE THE 98TH MEETING OF THE ELECTROCHEMICAL SOCIETY TO SHOW THE EFFECT OF ELECTROPLATING CADMIUM ON 1060 STEEL WHICH HAS BEEN CLEANED BY (1) ACID PICKLING OR (2) ABRASIVE TUMBLING

	% of Initial Strength of Raw Steel
As received	100
SiC tumbled	95
SiC tumbled—acid pickled	95
Acid pickled—plated	59
SiC tumbled—plated	94
Acid pickled—wait 24 hours—plate	98

(1) Storage temperature 77 deg. F.
(2) Bend tests conducted 24 hours after pickling or plating.

EFFECT OF TEMPERATURE ON RECOVERY OF 1060 STEEL FROM PICKLE BRITTLENESS

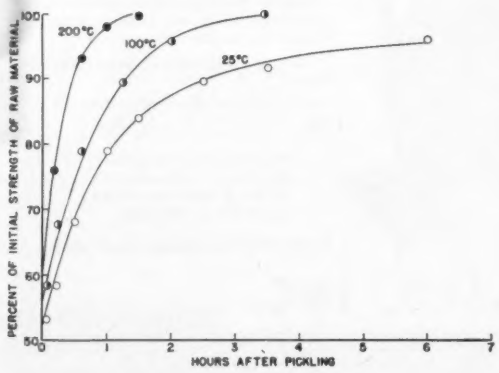

Figure 3
(Based on a report by Prof. R. C. Weast before the 98th Meeting of the Electrochemical Society.)

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EFFECT OF TEMPERATURE ON RECOVERY RATE OF CADMIUM PLATED PICKLED STEEL

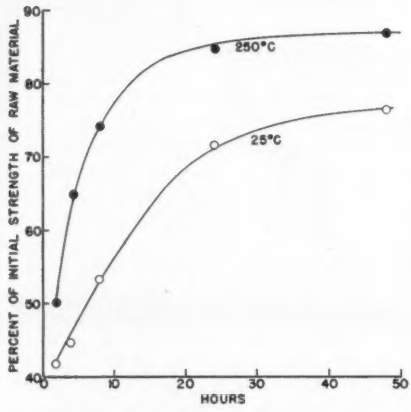

Figure 4
(Data presented by Prof. R. C. Weast, Case Institute of Technology, before the Electrochemical Society).

4. Figure 5 shows the same data for 1060 steel, the surface of which had been prepared by tumbling. The conclusion that Prof. Weast drew from his experimental work was that hardened S.A.E. 1060 steel can be successfully electroplated with cadmium without permanently embrittling the steel if certain precautions are observed.

Additional data on picking brittlenesss were given in a paper by Carl A. Zapffe and M. Eleanoor Haslem, Baltimore, Md. This paper covered work conducted to determine the effect of pickling bath additions, other than inhibitors, such as surface active agents and foaming compounds. Measurements of bondability using the wire-bend test were used to follow qualitatively the changes produced by each addition used alone and in combination with inhibitors in a standard 10 per cent sulfuric acid pickling bath.

Zapffe has previously published data to show that certain "promoter elements", particularly sulfur, selenium, and arsenic, and also phosphorus, tellurium, and antimony can increase the extent of pickling brittleness. These impurities, common in many steels, occupy closely related positions on a periodic chart, and are characterized by the fact that small traces in pickling solutions may increase hydrogen absorption a great many times over that caused by pickling in pure acid. Sulfur, selenium, and phosphorus are frequently added to steels in significant proportions to import free-machining qualities. Many plant problems of brit-

EFFECT OF TEMPERATURE ON RECOVERY RATE OF CADMIUM PLATED—TUMBLE CLEANED 1060 STEEL

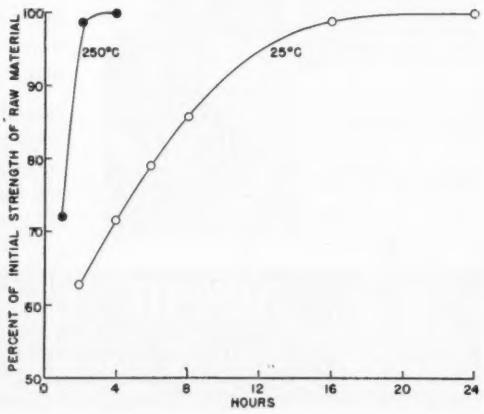

Figure 5
(Reported by Prof. R. C. Weast to the Electrochemical Society)

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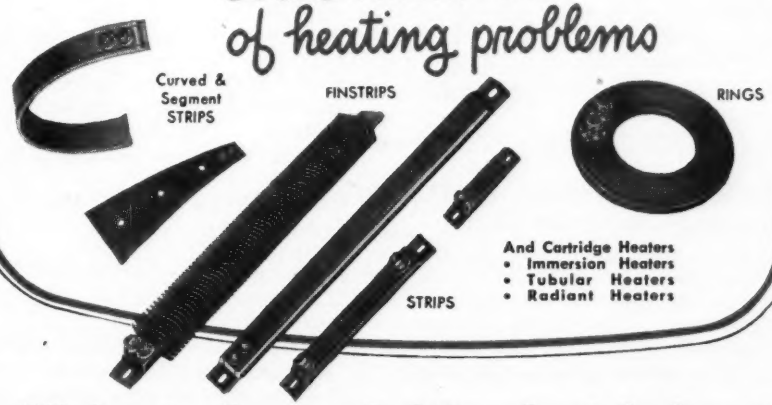

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tleness, blistering and other difficulties traceable to hydrogen may thus actually be the result of the pickling liquor leaching out these "promoter elements" and storing them in the solution where they can exert their effort upon subsequent batches of steel. It is good practice to use special care in scheduling and pickling of the free-machining grades because of this contaminating effect, and if trouble occurs, it is worthwhile to examine the condition of the pickling solution being used.

* * *

Preparation of Nickel-Silver, Brass and Copper for Plating

TYPICAL production cycles used to prepare holloware and flat ware for plating at the plant of Oneida, Ltd., were described before the Symposium by Daniel Gray, chief chemist at Oneida. The cleaning of holloware is complicated by several factors. The size, shape and weight of the articles prohibit any violent mechanical agitation. Intricate designs stamped or embossed on the metal retain finishing compounds long after the general surface is cleaned. Many pieces have ornamental borders, handles, spouts or legs cast from lead-antimony alloys or high-tin alloys. These combinations may tend to promote undesirable electrolytic action. The surface preparation cycle used for holloware at Oneida was outlined by Daniel Gray as follows:

1. Rack.
2. Soak clean in an alkaline cleaner.
3. Rinse.
4. Cyanide dip for work stained or tarnished.
5. Rinse.
6. Electrocleaner, cathodic.
7. Rinse.
8. Unrack.
9. Brush, scour, or sponge. Insides of hollow articles are wet-brushed or scoured with pumice. Articles having intricate designs are sponged. This operation is done by hand.
10. Rack.
11. Rinse.
12. Electrocleaner No. 2.
13. Rinse.
14. Hydrochloric acid dip.
15. Rinse.
16. Nickel plate. A light nickel plate is used to get a good silver strike and plate on the mounts. Without nickel the tendency is to acquire a white, rough silver deposit.

According to data given by Gray, the method of preparation used for flatware at Oneida is divided into two stages; namely, precleaning and plating room cleaning. This is necessary because all work must be inspected before leaving the finishing department for the plating room. Precleaning is employed to remove various kinds of soil which have been accumulated by the operations of grinding, polishing

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and buffing. To clean work at this stage a diphase emulsion cleaner is used. The work is loosely packed in perforated metal baskets and agitated vertically so that it repeatedly breaks the surface of the cleaning solution.

Plating room cleaning is accomplished with automatic machines, as is the plating operation. The forward motion of the work is effected by a screw conveyor. Racks are lifted from tank to tank by chain conveyors with lifts accurately timed. The following cleaning cycle was given by Gray as being typical of that used at Oneida for flatware:

1. Rack.
2. Hot soap solution.
3. Hot alkaline soak.
4. Cathodic electrocleaner.
5. Rinse.
6. Cyanide dip.
7. Rinse.
8. Hydrochloric acid dip.
9. Rinse.

The hydrochloric acid dip is used to neutralize all alkali that may adhere to the rack or work, as well as to activate the metal surface and promote good adhesion of the electroplate. It was emphasized by Gray that one of the surest ways to avoid trouble in the cleaning operation is to "dump" the cleaners before they become exhausted.

A system of constant checking is used at Oneida to check the day-to-day production. All work coming to the plating room is spot checked for cleanliness. If it is considered too dirty it is sent back to the precleaning department. Samples of plated work are taken hourly and sent to the laboratory for adherence tests. After finishing, every piece is individually inspected. Weekly records of plating defects are sent to the laboratory. From these records, graphs are drawn. Any irregularity commands the immediate attention of the laboratory.

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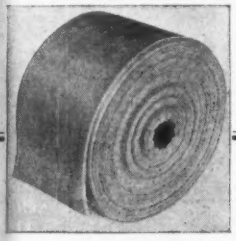

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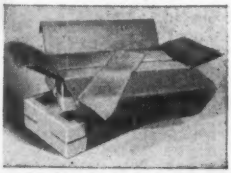

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Douglas Cuts Finishing Time in Half By Using Hot-Spray Lacquer

New Process Adopted for Production of Navy Aircraft at El Segundo, Calif.

Douglas Aircraft Company (El Segundo Div.) has adopted hot-spray lacquer for finishing of many metal parts, including aluminum, at El Segundo. Use is growing steadily, because of savings such as these:

Time-saving equivalent to 27½ hours in finishing AD-4 airplanes.

Booth time cut from 27½ hours to 18½ hours with present crews and equipment.

Equivalent of 2 gallons of lacquer and 8 gallons of thinner saved per plane.

Hot-spray method, with only one coat, removes hazard of sanding through the first coat of lacquer on rivet heads and skin laps.

The conclusions which led Douglas to use hot-spray lacquer for Navy production, based on thorough tests, were:

1. Required film thickness can be applied by one hot cross coat where two cold cross coats are necessary.

2. Salt spray and weatherometer tests show the hot sprayed film to be superior.

3. Smoother and glossier appearance.

4. Eliminates sanding between coats.

5. Affords maximum uniform film thickness over rivets and seams, by elimination of scuff sanding, thereby giving better protection in service.

This AD-4, built by Douglas for the Navy, is one of hundreds on which hot-spray lacquer based on Navy Spec. 52L26 (Aer.) is used to cut finishing costs and time.

6. Reduces application time 50% with a resultant increase in production.

7. Saves materials by less over-spray and less solvent required.

8. Has better flow-out and decreases tendency to sag, blush or orange peel.

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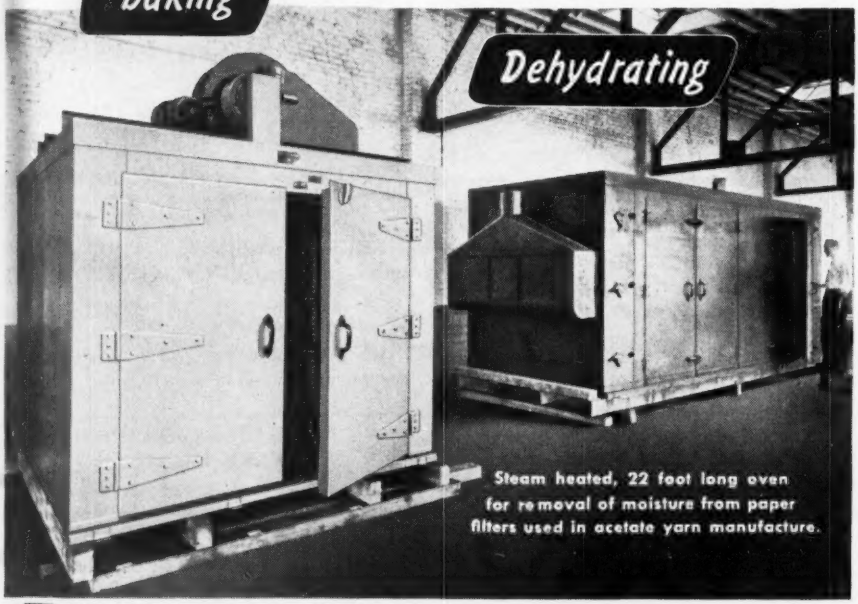

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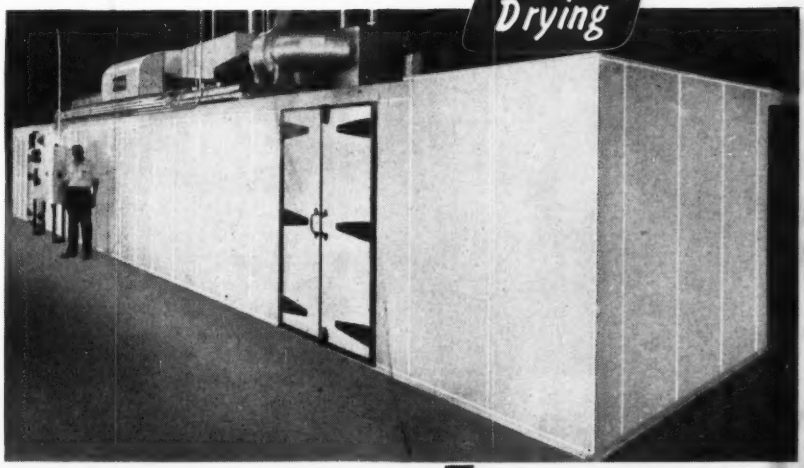
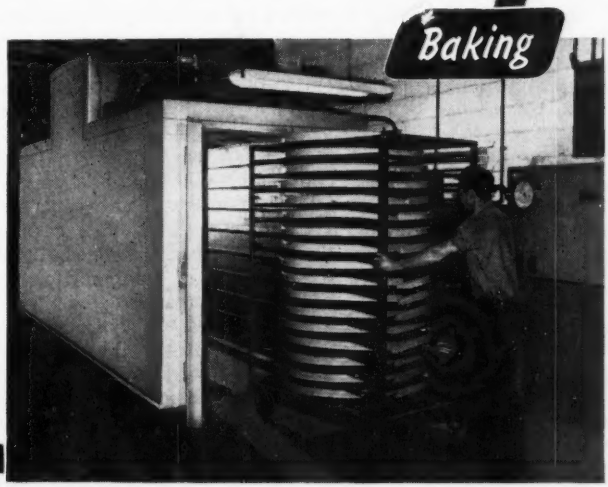


This conveyorized, moisture removal oven dries two ground coats of frit on stove parts. It is automatically controlled.



This oven assures uniform color on enamel-finished metal trim for plastic table tops. Almost 5000 pieces of trim are baked per day in 15 minute cycles.

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Radioactive Tracer Method Used to Define Sensitivity Limits of Cleanliness Tests

VERY little is known concerning the sensitivity of the various methods that have been proposed to determine the degree of surface cleanliness of metals. R. E. Kamp, Monsanto Chemical Company, reported on the application of the radioactive tracer technique to define the apparent limits of sensitivity of the water break, fluorescent dye, and copper plate methods for determining surface cleanliness. J. C. Harris and W. H. Yanko, also of Monsanto, collaborated in this work. Quantitative limits of sensitivity of the various methods were reported.

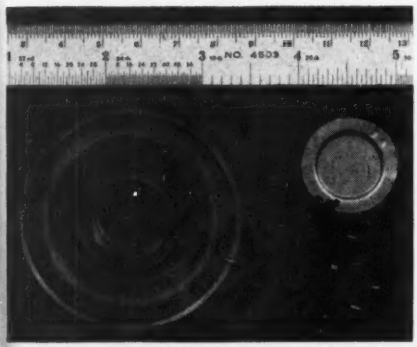

Fig. 6—Sample steel test piece (right) used in radioactive tracer method for evaluation of cleanliness tests conducted in Monsanto chemical laboratories. Piece shown at left is plastic holder used in making measurements. (*Photo courtesy the Electrochemical Society*).

The details of the new radioactive tracer method for surface cleanliness measurements, as used in the Monsanto Laboratories, were reviewed in the November, 1949, "Spotlighting Finishing Progress" section of PRODUCTS FINISHING. In this most recent report by the Monsanto workers essentially the same technique was used except that it was used to evaluate quantitatively the degree of soil removal in other cleanliness tests. The radioactive tracer method is carried out by combining with an oily soil a C_{14} tagged organic compound, dispersible in the oil, permitting a quantitative estimate of soil removal or retention using a Geiger-Muller tube assembly. The sensitivity of this method has been measured as 2×10^{-7} gm./sq. cm.; Figure 6 shows a typical test piece used in the radioactive tracer method.

The cleaning procedure involved full immersion of the test pieces suspended from hooks in a boiling solution of cleaner consisting of 5 per cent Santomerse No. 1 and 95 per cent anhydrous sodium metasilicate. The concentration of the cleaner used was 5 per cent by weight. After cleaning, test pieces were rinsed using six dips in boiling water. The panels after cleaning, rinsing and drying were first subjected to the ultraviolet light test. (A small amount of 2 per cent Fluorescent Green HW 175 per cent dye was also used in the soiling mixture.) Under ultraviolet light a clean metal surface appears black, while residual oil glows with a brilliant fluorescence. This fluorescence can be photographed, thereby providing a method for recording the location and amount of oil residue both before and after cleaning.

The second test used was the determination of residual surface radioactivity. The third test applied to the cleaned specimen was the water break test. The panel was immersed in a stream of distilled water at room temperature and examined. This test is based on the fact that a clean metallic surface is capable of being uniformly wetted by water, resulting in a continuous water film on the surface. Soiled areas cannot sustain the film, and give rise to discontinuities, or "water breaks". The water break method has recently been criticized because of the possibility of false film continuity and the dependency of the water break on the thickness of the water film.

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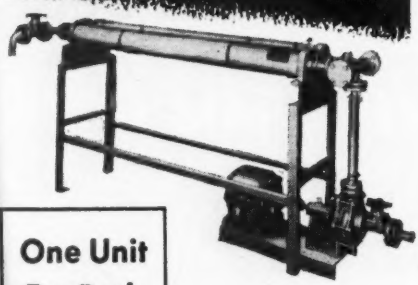

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Following this, the copper plate test was applied. The test pieces were immersed for three minutes in a solution containing 40 gm./l. of copper sulfate plus 17 gm./l. sulfuric acid. At the end of this time the test piece was examined for plate adhesion by vigorously rubbing the surface with several thicknesses of fine absorbent paper. These tests showed that the cleanliness evaluation methods could be arranged in the following order from least to most active:

	Comparative Sensitivity
Fluorescent dye (least sensitive)	1
Copper plate	4
Water break	11
Radioactive tracer (most sensitive)	110

The comparative sensitivity ratings were devised by taking the least sensitive fluorescent method as unity. According to data given by Kamp, the various methods of determining cleanliness cease to function for the various systems between the following limits:

	Sensitivity limits in gm. of soil/sq.cm.
Fluorescent dye	2.3×10^{-5} to 5.7×10^{-6}
Copper plate	6.4×10^{-6} to 2.0×10^{-6}
Water break	2.4×10^{-6} to 4.4×10^{-7}
Radioactive tracer	1.7×10^{-7} to 0

The radioactive tracer technique appears to be a distinct advance in testing cleaner efficiency because it is quantitative in character and is more sensitive than existing methods.

* * *

Improvements in Reading the Hegman Grind Gage

THE appearance and durability of paint films are influenced by the particle size of the pigments used. Technologists in the finishing industry using the Hegman fineness of grind gage as a control tool will be interested in the results of a recent investigation conducted by the Sherwin-Williams

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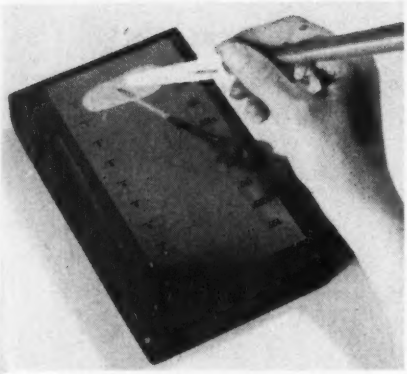


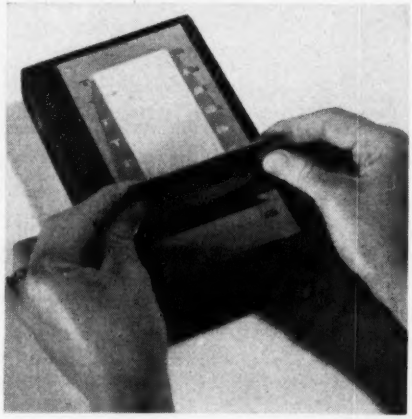
Fig. 7—The Hegman Fineness of Grind Gage used in the Sherwin-Williams laboratories, showing sample being added for test. This modified gage has a 2-inch channel width. (*Photo courtesy The Sherwin-Williams Co., Cleveland 1, Ohio*).

Company to secure more accurate results with this method. A special committee*, appointed to investigate the problems arising at Sherwin-Williams, was composed of D. Doubleday, Dispersion Research Laboratory, Chairman, R. Bruhn, Paint Research Laboratory, and A. Brolin, Technical Service Laboratory. The modified method developed by the investigators provides visual standards which can be used to identify grind patterns and which, if used properly, will bring fineness gage readings into agreement.

Although various modifications of the fineness of grind gage are available, their basic value lies in the development of a wedge of paint in a calibrated channel as the principle of the test. The fundamental feature is a wedge shaped channel ½-inch wide, ranging from zero to 5 inches long, which is cut in a hardened tool steel block (Figure 7). A linear scale is etched alongside the channel. It begins with zero where the channel is 0.004 inch deep and progresses in equal divisions to 8 where the channel is zero inches deep. Hegman gages having side-by-side channels to permit visual comparison of two samples have been used. However, for most purposes it appears to be just as simple to evaluate samples by means of the numerical designation.

The Sherwin-Williams test method specified that with the gage lying flat, a sufficient amount of material to be tested be put in the deep end (O-Hegman) of the channel so it overflowed slightly. The scraper, held in a perpendicular position between the thumb and the index finger with both hands, is drawn down the channel using firm pressure (Fig. 8).Following this draw-down operation the gage is then immediately held at such an angle as to get good light reflectance characterized by grazing incidence. It is then read at that point where many particles appear on the surface of the film

Fig. 8 — The draw-down being made in the Sherwin-Williams modified Hegman Grind Gage. With the scraper held perpendicular between the thumb and index finger with both hands, it is drawn down the channel using firm pressure.
(*Photo courtesy The Sherwin-Williams Co., Cleveland 1, Ohio*).



* Complete details of the experimental procedure followed to develop these improvements have been described by D. Doubleday and A. Barkman in a recent issue of "Paint, Oil & Chemical Review."

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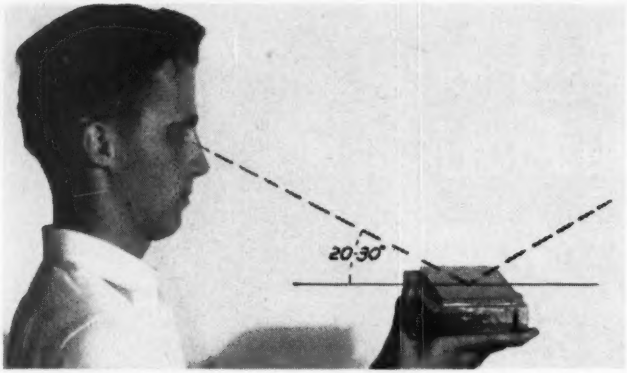

Fig. 9 — The correct method of inspecting the paint wedge film surface in the Hegman Gage. *(Photo courtesy The Sherwin-Williams Co., Cleveland 1, Ohio).*

in the channel, disregarding isolated or occasional particles in the deeper end of the channel. Figure 9 shows a gage user inspecting the paint film in the test instrument.

The Sherwin-Williams program to examine the Hegman test procedure was actually brought about through observations made during an investigation of mill production rates. It was found, especially with a high quality dispersion, that accurate grind designation was a rigid requirement if maximum production rates were to be maintained. The chief point in question appeared to be the actual end point designation for a particular sample. It was noted that two identical batches could be designated as 6 on the Hegman scale, but one would have twice the output rate of the other. The only variable was the dispersion; both would be in the 6 range but the high output ended toward a 6 designation while the other tended toward a 7. Further investigation showed that the various testers could interpret an identical pattern anywhere from 6 to 2.

The investigation centered around two principal lines of attack: the effects of various physical conditions involved with the technique of sample and gage handling; and, the variation due to difference in grind pattern interpretation when selecting a designating

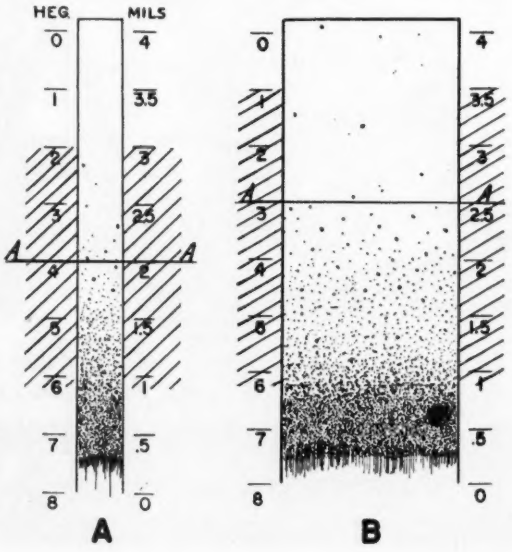

Fig. 10—Visual standards for use with the Hegman Fineness of Grind Gage developed by Sherwin-Williams. The line A-A represents the optimum grind designating line as established by the distribution curve of a survey of some 150 testers. "A" is a reproduction of a ½-inch section of "B", showing that a 2-inch section will give lower readings than a ½-inch section. *(Illustration courtesy The Sherwin-Williams Co., Cleveland 1, Ohio)*

FOR NON-OILY, INVISIBLE RUST PROTECTION
PRESERVING BRIGHT FINISHES...
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IMMUNOL added to any water immunizes that water against rusting most metals. Applied to metal parts, it provides immediate rust protection with a film so thin it can't be seen. IMMUNOL solutions are never oily or tacky, require no time lapse for drying and remain on parts indefinitely unless washed off.

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line. The latter problem was solved by making up a set of drawn standards covering the whole gage range, and each was given the grind designation that was indicated from the results of a survey conducted with approximately 150 gage users. Figure 10 shows the type of drawings which are used as standards. Figure 10-A consists of an exact reproduction of a ½-inch section of Fig. 10-B. Line A-A represents the optimum grind designating line as established by the distribution curve of testers contacted in the survey. The distribution curve gave graphic proof that the 2-inch section Hegman gage will produce lower readings than a ½-inch section when the same material is used. The shaded area shows the range of readings reported by those contacted in the survey.

Certain other revisions in the test procedure were found to be desirable as a result of the investigation. The sample to be tested must be representative of the batch under consideration. If the sample represents a final reduced product it can be used directly for the test. If the sample is a paste paint or a pigmented base, it should be reduced approximately as it would for application and use. Reduction should be made with materials equivalent to those used in the actual letdown. The same varnish should be used as specified by the formula. The remaining liquids should be considered as all thinner and that proportionate volume should be used.

Several precautions should be used in manipulation of the gage. The drawdown blade should be checked frequently for nicks or uneven wear. One good way of doing this is to place the blade edge on the block's level surface and sight through the contact line against good light. Preparatory to making a test the gage should be placed on a flat surface and wiped clean with a lint-free cloth. A sufficient amount of material to be tested should be placed in the deep end of the slot so it slightly overflows the slot. Using the drawdown blade, the material should be drawn down the length of the slot. The position of the blade throughout the draw-down should be perpendicular to the block's surface and at right angles to the slot's length. Pressure should be firm enough to clean the level surface of the block, as shown in Figure 8.

Readings should be made immediately after completion of the drawdown, with a time lapse not exceeding 10 seconds. In reading the gage, it should be viewed from the side so that the line of vision is at right angles to the slot's long dimension. Care should be taken to hold the gage in such a light source that the pattern is readily visible. For actual reading, the angle between the surface of the block and the line of vision should be no more than 30 degrees nor less than 20 degrees. Two additional tests should be made, with the first test being considered as preliminary.

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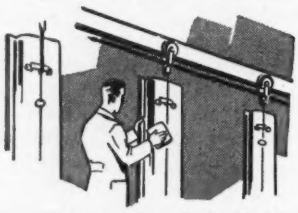
for better, cleaner finished jobs



Remove the specks, lint, dust from surfaces to be painted; wipe them off with a Dust-All Tack Rag; be sure of fine, blemish-free, finished jobs.

Get the Dust-All Tack Rag in the familiar Red Checkered Bag; also available in 150-250-500 yard rolls.

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LANSING 4, MICHIGAN

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LOW FIRST COST

The initial cost of Platecoil is often 50% or more below the cost of equivalent pipe coil depending, of course, on the materials used in construction.

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By the use of "quick change hangers" Platecoil installations can be made in open tanks in one-half hour or less by one man and a helper.

NO THREADED JOINTS IN TANK

The entire Platecoil is electric welded and pressure tested. There are no joints to corrode or leak. Both connections to the Platecoil can be located above the liquid level where there is no danger of thread corroding and freezing.

GREATER TANK CAPACITY

A 22" x 47" Platecoil gives the same heat transfer surface as 32 feet of 1½" pipe. This pipe requires a space approximately 30" x 60". Platecoil thus saves about 50% over equivalent pipe coil.

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Weighing only about half as much as equivalent pipe coil, Platecoil is easy to handle. A whole maintenance crew is not needed to transport and install Pipecoil.

TANK MAINTENANCE WITHOUT LOSS OF SOLUTION

There is no need for workmen to get inside the tank in order to make replacements or repairs. A Platecoil can be removed in a matter of minutes with the solution still in the tank.

LITERATURE

The new Platecoil Bulletin furnishes a complete description of the Platecoil method of tank heating. Write for your copy today.

HIGH BTU TRANSFER

More prime surface of Platecoil can be installed in a given area than can be obtained with pipe coil. Thus a more compact Platecoil unit provides much greater BTU transfer per unit area than can be obtained with pipe coil. Quick starts in heating tank solutions mean more hours of productive time.

Kold-Hold Manufacturing Company, Lansing 4, Michigan

In interpreting the grind patterns, the initial draw-down should be inspected for the type of grind pattern and the approximate grind, and this should be checked against the visual standards to select the one that most nearly matches it. Using this standard, the imaginary line that will be used on this particular pattern should be determined. This procedure is followed for successive samples. The Sherwin-Williams investigators recommended that the average of the last two readings be used, and the grind be reported to the lowest ½ of a Hegman unit, that is, between 6 and 6½, the grind is 6 Hegman divisions. These visual standards plus the new test precautions appear to offer promise for improved duplication of results with the Hegman grind test.

Unsightly bathroom and kitchen window sills can now be brightened with colorful steel sills finished in permanent, acid-resistant porcelain enamel available in attractive shades for every decorative scheme.

ALKYD RESINS FOR MARINE PAINTS. It will be recalled that during the last war, the Navy adopted alkyd-based coatings for practically all areas of ships above the water line. This development has resulted from years of careful testing, described as probably the outstanding example of the recognition of alkyd resins. It is interesting to note that the British Navy has adopted paints based on alkyd resins for exterior marine finishes.

A recent publication of the Lead Industries Association (Red Lead Technical Letter No. 4, New York, Lead Industries Association, 1949, 9 pp.) offers formulas for red lead paints for marine exposures. These paints were selected on the basis of outstanding performance under practical exposure conditions, including marine atmospheres, intermittent immersion and continuous immersion. Significantly, of the twelve formulas offered for the production of the red lead paints, ten employed alkyd resin vehicles, most of these being glyceryl-phthalate resins.

RUST INHIBITOR AND METAL-WORKING LUBRICANT. An oil base soluble in an aqueous medium and adapted for use as a rust inhibitor is described in a recent patent (Schiermeier, U. S. Patent 2,516,-838). According to this patent, this compound will also act as a metal-working lubricant, and contains the following materials in these approximate proportions:

	Parts by weight
Water	11.8
Sodium hydroxide	2.4
Formalin (approximately 40 per cent HCHO)	2.2
Glycerine	6.1
Ethylene glycol ethyl ether	5.8
Hydroxy aliphatic hydrocarbon carboxylic acid having 18 carbon atoms and not more than one double bond in the molecule	16.6
Sodium petroleum sulfonate (oil soluble)	46.1
Extra winter strained lard oil	9.0

The above composition is blended with a liquid petroleum oil base, the oil base comprising from 70 to 90 per cent of the mixture. —*Glycerine Information Service.*

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Write today for fully illustrated catalog showing Brookfield Viscometers adaptable to any viscosity problem from less than one to 32,000,000 centipoises.
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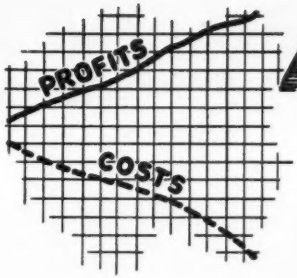

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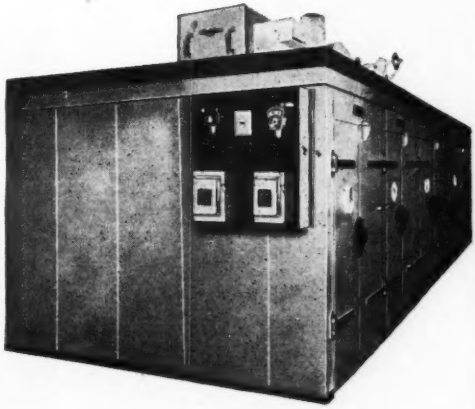

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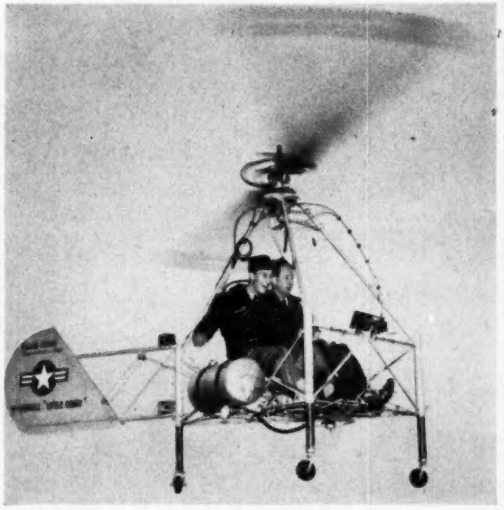
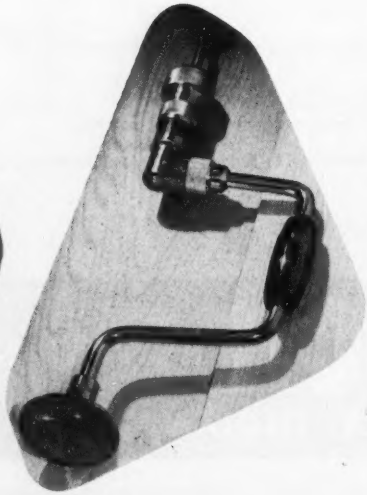


● The Air Force's ram-jet helicopter, dubbed "Little Henry" by McDonnell Aircraft Corporation engineers, is finished in yellow lacquer applied over steel tubing.

(Photo courtesy McDonnell Aircraft Corp., St. Louis 3, Mo.)



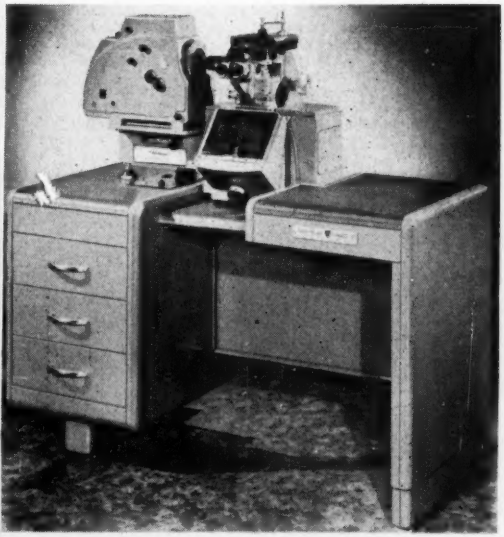
● A useful addition to any tool box is this nickel plated ratchet bit brace, with knob and handle molded of shatterproof Tenite plastic.

(Photo courtesy Tennessee Eastman Corp., New York 16, N. Y.)

that aid in appearance and utility

● **The andirons here illustrated are made from solid brass, polished and buffed to a high luster, then coated with clear lacquer.**

(Photo courtesy Wayne Agricultural Works, Inc., Goldsboro, N. C.)



● **The steel sheet units of this redesigned, improved metallograph are phosphatized and finished in a four-coat process. The prime coat is baked on, followed by two coats of gray enamel and a finishing coat of lacquer. All knobs and scales are nickel and chromium plated. The nickel produces a non-glare finish for easy scale reading. The arc lamp is an aluminum casting finished with a special high-temperature baking enamel.**

(Photo courtesy American Optical Co., Instrument Div., Buffalo 15, N. Y.)

PRACTICAL APPLICATIONS *of Modern Products*

Zinc Plating and Lacquer Provide Finish for Steel Conduit

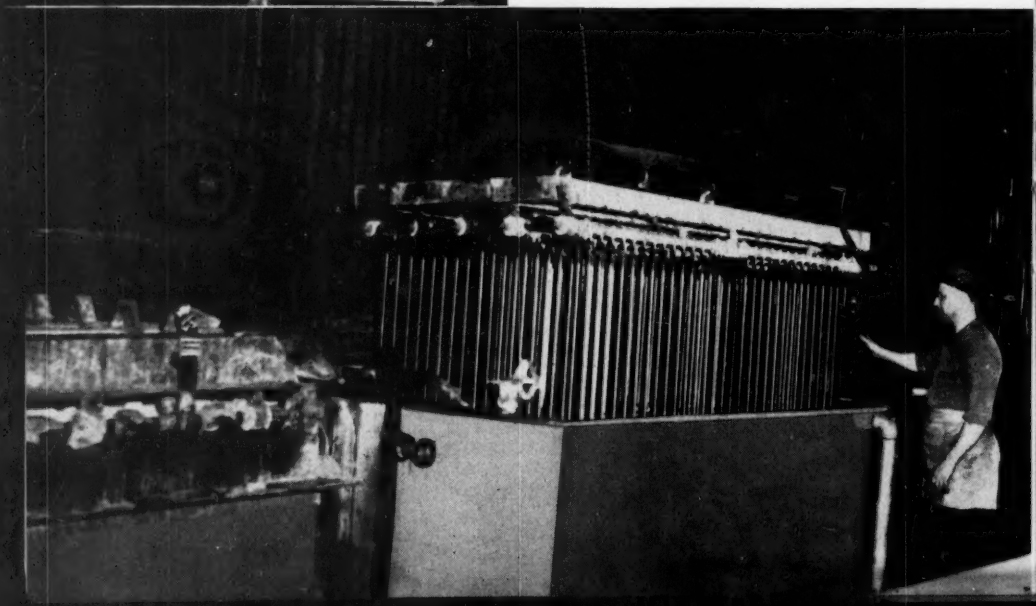
THE National Supply Company's newest product for the electrical industry, "Central" Electric Metallic Tubing, receives a complete exterior and interior surface finishing to give it added protection against the assaults of time.

The tubing is made at the Etna, Pa. plant of National Supply's Spang-Chalfant Division. It is a lightweight steel conduit and is adaptable to a wide variety of electrical raceway services.

Manufactured from cold strip, the

Fig. 1 (left)—Loading Electric Metallic Tubing into cages at the Etna, Pa. plant of the Spang-Chalfant Division, The National Supply Company. The tubing is transported on these cages through the electroplating cycle.

Fig. 2 (below)—Spang-Chalfant's Electric Metallic Tubing is lowered into the first bath in finishing process at the company's Etna, Pa. plant.



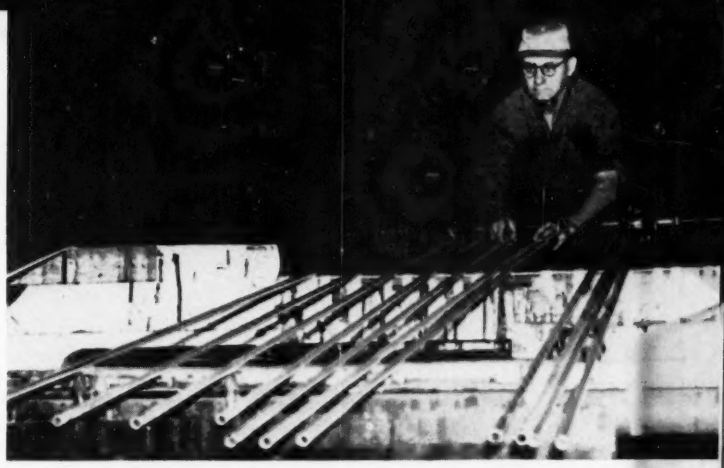


Fig. 4—On this rack Spang - Chalfant's Electric Metallic Tubing receives its interior lacquer coating. The tubing is placed against the nozzles shown in background which force a clear lacquer through it.

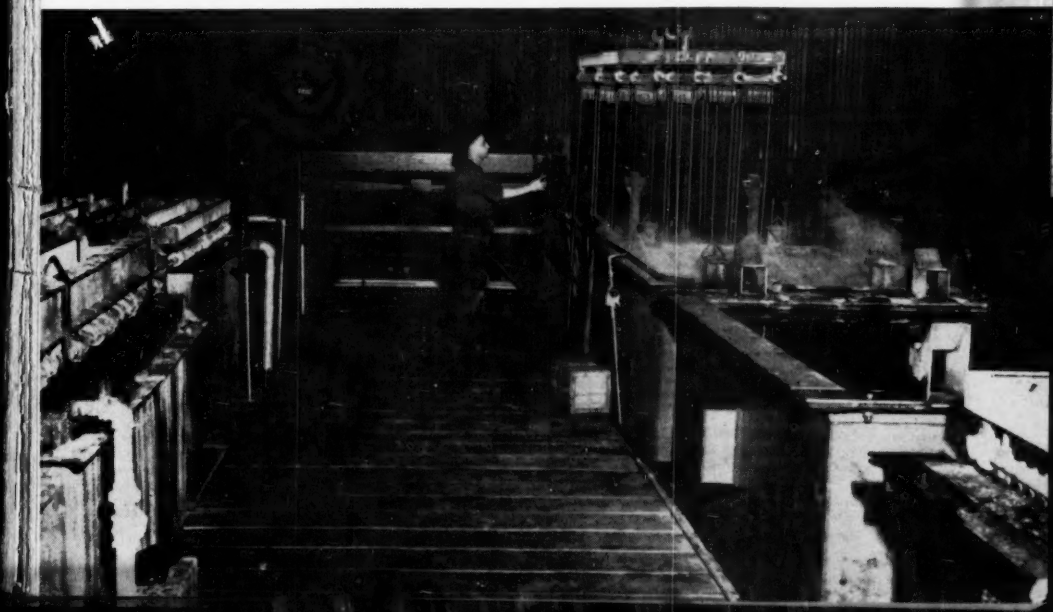
tubing is made in an electric resistance weld tube mill and cut off into 10-foot lengths. Then the ends are reamed and chamfered. Next the tubing is ready for the surface finishing consisting of zinc electroplating the exterior and lacquer coating the interior.

To begin the finishing cycle, the tubing is loaded into cages which are suspended from a monorail crane. The crane moves it from stage to stage until the cycle has been completed.

The tubing is first cleaned and pickled in sulfuric acid, then rinsed in water, and moved to the electroplating tank, where it receives an exterior coating of zinc. When the plating has been completed, the cage moves on to another clear water rinse, and then to an acid bath which brightens the finish. Before the tubing is removed from the cage it is given a hot water rinse.

Unloaded onto an inside painting

Fig. 3—View of the tank lineup for finishing Electrical Metallic Tubing. Tubing travels in cage, shown at right, throughout cycle which includes necessary pickling, rinsing baths, zinc electroplating, and an acid brightening solution.



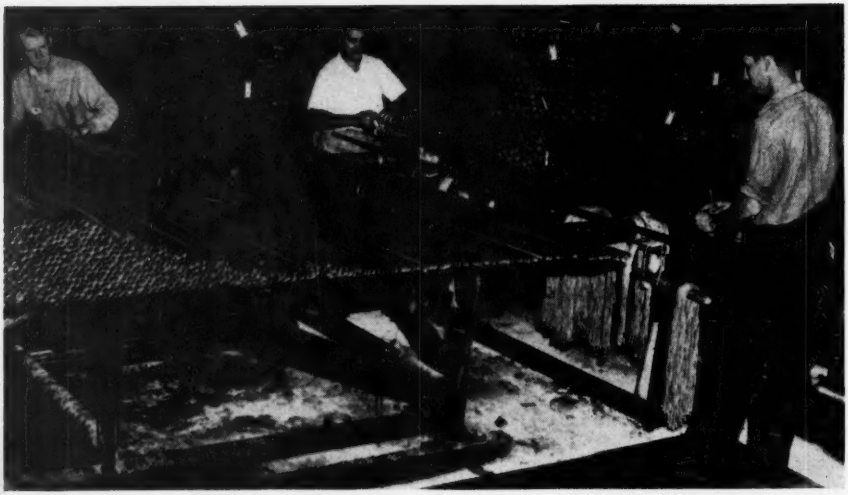


Fig. 5—Before shipment, Spang-Chalfant's Electric Metallic Tubing is carefully inspected, then bundled on these racks. Now ready to go to the user, the tubing has been finished with a zinc exterior coating and a lacquered finish on the inside.
(Photos courtesy The National Supply Co., Pittsburgh, Pa.)

rack, the tubing is placed against nozzles which force a clear lacquer over the interior surface. It is removed from the nozzles and conveyed along racks past hot air fans which dry this fresh lacquer coating.

Finally, the Electric Metallic Tubing arrives at the inspection table where the finishing job is thoroughly checked.

An Underwriters' Laboratory approval label is put on each piece, the tubing is bundled and prepared for shipment.

Metal Cleaner Decreases Paint Failures

By BERT DOGGETT
Paint Superintendent, Ironrite, Inc.
Mt. Clemens, Michigan

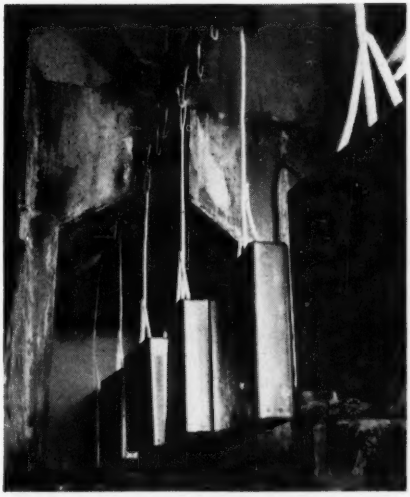
PAINT failures on the popular Ironrite Ironer have been reduced to a minimum by the use of a new type phosphatizing cleaner, which cleans metal and deposits a tightly adherent phosphate coating at the same time. This coating not only retards rust, but provides an excellent bond for paint finishes.

The cleaning and conditioning material we employ is Klem Kote, used in a three-stage washer. After the metal is cleaned and coated with Klem Kote, it is given a hot water rinse, and finally rinsed with Tacomite (chromic phosphoric rinse). The temperatures we use are between 170 and 180 deg. F. Another advantage of these chemicals is that they are not critical and do not break down at the operating temperatures employed.

Following recommendations of the manufacturer, we use Klem Kote in concentrations of one to two ounces per gallon of water. The material is non-toxic, non-fuming, and requires no special care in handling.

Normally, the Klem Kote washing process requires about one minute, but

For more complete information on products and processes use READER SERVICE CARDS inside covers.



Metal cleaning and conditioning are accelerated in the plant of Ironrite, Inc., where these sheet steel metal legs are shown entering a three-stage washer.
(Photo courtesy Ironrite, Inc., Mt. Clemens, Mich., and Klem Chemicals, Inc., Dearborn, Mich.)

when surface rust is apparent, this is increased to four or five minutes. Rust spots may still be visible, but our experience in the reduction of paint failures indicates that they have been passivated.

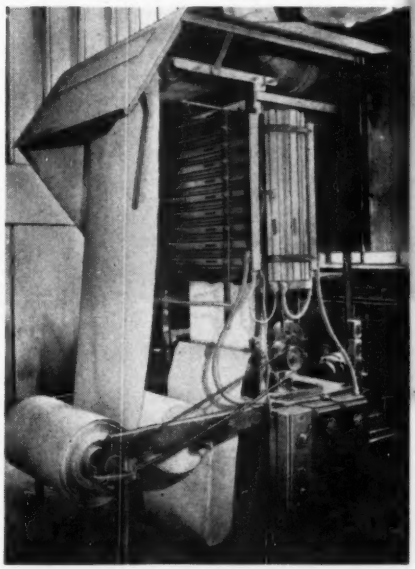
Infra-Red Heat Accelerates Coating of Abrasive Cloth

COATING of abrasive cloth has been accelerated tenfold by changing to Chromalox all-metal electric Radiant Heaters, manufactured by Edwin L. Wiegand Co., 7552 Thomas Blvd. Pittsburgh 8, Pa. The former heat source permitted a maximum web speed of ¾ foot per minute compared to 8 feet per minute now attainable at the Simonds Abrasive Company, Philadelphia.

The compact installation of coating the cloth with a synthetic resin and curing under infra-red heat is shown in the photograph. In this operation rolls of cloth impregnated with abrasive grit are first fed through a dip tank, pressed through rollers to squeeze out excess fluid, then passed between radiant heater banks for curing, and lastly, rewound on rolls.

To completely and uniformly heat the 27-inch wide cloth, 24 of the 230-volt, 1400-watt radiant heaters are used. There are nine heaters on the front and back and three on each side. The 230-volt heaters are operated two in a series on 460 volts. Total installed capacity is 33.6 kilowatts.

The volatiles given off in the baking process are removed by forced ventilation through a hood above the radiant heaters.



Abrasive cloth being coated and cured under Chromalox Radiant Heaters

Infra-Red Lamps Speed Drying in Pacific Coast's Largest Auto Paint Shop

THE Durable Auto Painting Company of Los Angeles, largest on the Pacific Coast, is quite logically equipped with the largest bake oven too. Occupying 910 sq. ft. in an area of 25,000 sq. ft. devoted exclusively to automobile painting, the huge oven is equipped throughout with Nalco Infra-Red Lamps manufactured by the North American Electric Lamp Company of St. Louis.

Incoming cars are first completely cleaned and hand-sanded by specialists. After careful masking of chrome and glass work, trained spraying artists apply the latest scientifically developed synthetic enamels. This work is done in glass-enclosed, filtered-air spray booths.

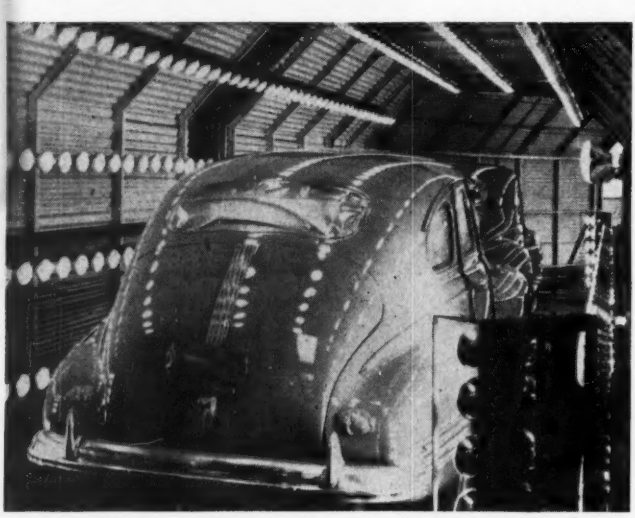
The cars then go into the gigantic baking tunnel. Here, the 528 individual Nalco Infra-Red Lamps thoroughly season and bake the enamel with their intense, penetrating heat. The result is a smooth, durable, dust-free finish. Because of the efficiency and speed of this drying operation, and the other extensive facilities for volume service, the company's 100 skilled workers are able to have cars ready for customers after only three or four hours.

Illustrating the importance of electroplating in the nation's essential household electrical appliances, the American Electroplaters' Society points out that of the 433 parts comprising today's telephone receiving set, 106 are electroplated with functional applications. Metals electrodeposited include zinc, copper, nickel, chromium, tin, silver and gold.

Tin plate producers, following up the research efforts of a hard-working team of scientists from Armour Research Foundation of the Illinois Institute of Technology, may remove palm oil from the production line and send in a new substitute —specially processed tallow.

Palm oil, which is imported, has constantly troubled the steel industry. Now, after two years of research, it has finally been decided that tallow—cheap and available in quantity from U.S. meat packing plants — would be an ideal substance for a substitute tinning oil.

●



Part of the 910 sq. ft. drying tunnel at the Durable Auto Painting Company in Los Angeles, showing arrangement of Nalco Infra-Red Lamps. *(Photo courtesy North American Electric Lamp Co., St. Louis 6, Mo.)*

How to get Finer Finishes at Lower Costs

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Direct Motor Drive

TILTING TUMBLING BARRELS

Available in Kiln-Dried Maple or Steel Shells

Process thousands of pieces at one time—faster, better and at lower cost—with Globe Precision Tumbling Barrels, dependable for 47 years. Globe's exclusive six-way work shifting motion cuts tumbling time and increases action. Speeds as low as 30 revolutions per minute assure finer finishes of non-ferrous metal parts. Motor is compactly mounted above the gear segment for space economy.

Free Experimental Service

Hupp's Experimental Engineering Laboratory can show you how to cut finishing costs. Just send samples of the parts to be processed along with a finished part. Write today! There's no charge or obligation.

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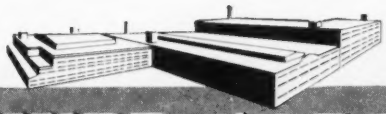

HUPP CORPORATION

GLOBE STAMPING DIVISION

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NEWS of the Industry

NEW PLANTS

Frank Brennen, Los Angeles branch manager of the **UNITED STATES TESTING COMPANY,** has announced the removal of that branch to 1723 S. Maple Ave., Los Angeles 15, Calif. The newly constructed building gives the laboratories several thousand feet of ideally adaptable space and much new equipment will be installed.

Many of the testing company's services, which were formerly referred to Hoboken, New Jersey, will now be conducted in Los Angeles. At present the Los Angeles branch is equipped to handle chemical, paint, engineering, and engineering-inspection tests.

Details of a $6,500,000 plant expansion program were announced recently by officials of **MINNESOTA MINING & MANUFACTURING COMPANY.** Most of the projects, located in ten cities and eight states, are already under way. Work on the others is due to begin shortly.

R. P. Carlton, 3M president, said the firm is expanding facilties at Atlanta, Ga.; Bristol, Pa.; Buffalo, N. Y.; Cleveland, O.; Lemont, Ill.; Wayne, Mich.; Boston, Mass.; and Hastings, Hutchinson, and St. Paul, Minnesota, which will provide additional manufacturing and storage facilities for all of 3M's major production divisions. The firm manufactures a wide variety of products including abrasives, "Scotch" Brand Tapes and other pressure sensitive adhesives, "Scotchlite" Reflective Sheeting, electrical and sound recording tapes, chemicals, and other products.

Construction of the projects is under the direction of C. P. Pesek, vice president of engineering and properties.

DETROIT CHEMICAL SPECIALTIES, INC., has moved into new and larger quarters at 101 South Waterman Street, Detroit, according to an announcement by Charles H. McAleer, president.

Occupying approximately 26,000 square feet, the plant is equipped with the most modern steam-jacketed mixing kettles, extruding machines, and other equipment for the manufacture of rubbing and polishing compounds. Manufacturing standards are maintained by a well equipped chemical laboratory and a staff of experts.

The company also manufactures a complete line of platers' supplies and equipment, as well as polishing and buffing compounds for the finishing of plated parts, grilles, bumpers, and so on.

The **NUBIAN INDUSTRIAL DIVISION** of **THE GLIDDEN COMPANY** of Cleveland can now meet industry's varied demands for industrial finishes. Largely responsible for this is the division's new laboratory at 1850 North LeClaire Avenue, Chicago.

The recently finished three-story laboratory building is devoted to solving any problem concerned with organic finishes for industry from control testing of raw materials to the application of new coatings under production line conditions, according to A. D. Duncan, vice president of The Glidden Company in charge of the paint and varnish division.

The quality control and raw material departments on the first floor work with instruments of all types to maintain rigid Glidden specifications. On the same floor the paint research department designs coatings to fit customers' requirements. The research staff also develops new resins and varnishes for use as such or in enamels, primers, and lacquers (Fig. 1). This latter research activity is carried

Fig. 1—Service department of new laboratory of The Glidden Company's Nubian Industrial Division in Chicago. Here technical service men are shown testing finishes.

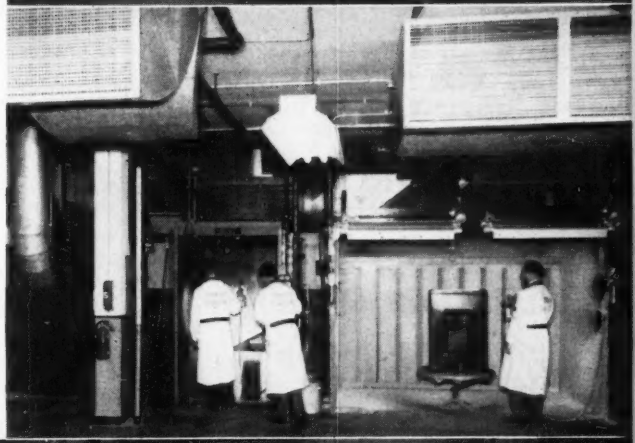


Fig. 2—Paint spraying booths in the laboratory's pressurized finishing room.

Fig. 3—(below) Overall view of pressurized room where finishes are applied and baked; (right) banks of infra-red lamps and gas oven, (left) electric ovens.

out on the second floor. Occupying the entire third floor, the service laboratory serves the customer in the solution of many problems and acts as a liaison between him and the research department.

Among the up-to-date laboratory equipment is a spray and baking room (Figs. 2 and 3) where all entering air is filtered and constant pressure maintained to prevent dust seepage.

The Glidden Industrial Division laboratory and its methods of operation are products of twenty years of planning, although most of the active development of the present program has been in progress during the last five years. The company has 26 service and research laboratories in various sections of the country to serve its numerous manufacturing operations.

Described as one of the most modern paint manufacturing units in the world, the $1,250,000 plant of the **PITTSBURGH PLATE GLASS COMPANY** was formally opened May 16 at Torrance, California. Located about 15 miles from downtown Los Angeles on a triangular 15-acre site fronting on Crenshaw Boulevard, the plant is equipped to produce a complete line of house paints, varnishes, resins, industrial and automotive finishes.

The two-story office building of 20,000 square feet houses the West Coast divisional office functions as well as those of the local warehouse and factory operations.

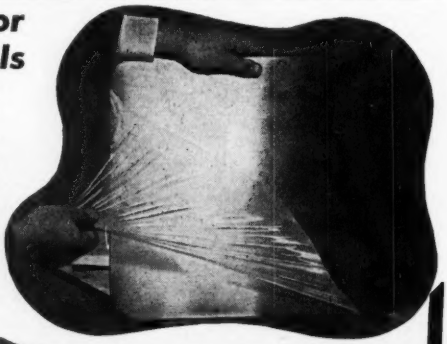
Pittsburgh Plate's new Torrance operation will be under the management of A. D. Wagen, West Coast divisional director.

COMPANIES

The year 1951 marks the 100th birthday of the **TAYLOR INSTRUMENT COMPANIES** of Rochester, New York. Starting as a tiny partnership for making household thermometers and barometers, the business of Kendall & Taylor showed an inventory in 1851 listing total assets at $919.00, of which $600.00 was for "knowledge of the business." The company has since become a multi-million dollar corporation manufacturing some 8,000 variations of its basic products and distributing them all over the world.

A Strippable Plastic for the Protection of Metals

Striplastic is a protective plastic applied by spraying, dipping or rolling. It is used on stainless steels, high polished metal sheets, sheets in cold working or drawing, tools, dies and parts, and on sheets or metal parts before packaging. It protects against scratching and abrasion, and against rust. Also available as a booth coat protection.

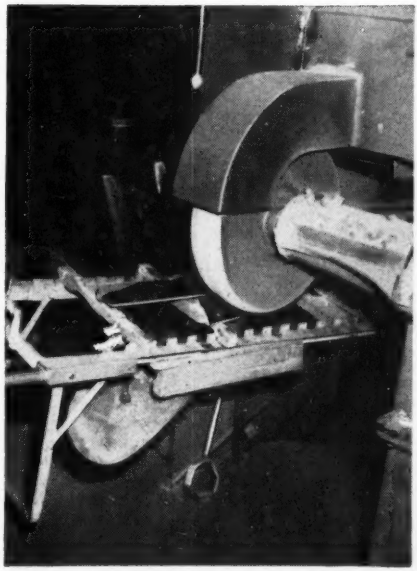


THE STRIPLASTIC COMPANY

Among many advantages, it is nontoxic, possesses great tensile strength and is easily stripped off in one piece. Write for complete information on this new strippable plastic.

10828 QUEBEC AVE.
CLEVELAND 6, OHIO

ALOXITE TP Grain for Top Performance



You can get finest results in polishing at low cost by selection from CARBORUNDUM'S ALOXITE aluminum oxide "TP"-series grain. The "TP" series features uniform size grain particles of controlled toughness and temper, in these types:

ALOXITE TP—tough, blocky grain with maximum efficiency for high stock removal. Recommended for polishing steel and other metals of high tensile strength.

ALOXITE TPC—medium sharp, tough grain. A general purpose grain well suited to polishing where small amount of metal removal is desirable.

ALOXITE TPT—sharp, extra-tough grain with clean cutting action that reduces finishing time in operations involving high stock removal.

See your CARBORUNDUM representative, or write Dept. PF 83-7 for illustrated booklet giving full details.

● *The brand name* CARBORUNDUM *identifies a* ***complete*** *line of coated, bonded and grain abrasives for metal finishing operations.*

POLISHING GRAIN by

CARBORUNDUM

TRADE MARK

"Carborundum" and "Aloxite" are registered trademarks which indicate manufacture by The Carborundum Company, Niagara Falls, N. Y.

83-7

THE MONROE SANDER CORPORATION of Long Island City, New York, manufacturer of Sanco varnishes, lacquers, paints, enamels and synthetics, observed its twenty-fifth anniversary on April 25th.

To mark the occasion, the founders of the company, Monroe Sander, president, and Eugene G. Bloch, executive vice president, sent to all their customers and suppliers an anniversary folder.

SOLVENTOL CHEMICAL PRODUCTS, INC., 15841 Second Blvd., Detroit 3, Mich., recently held its second annual sales convention in Detroit.

Several new metal cleaning products were presented which have been developed to fulfill needs arising from specialized applications in defense production. Also, the opening of a machining and spray washing equipment manufacturing plant, located at Victor and Brush Streets in Highland Park, Michigan, was announced. Howard B. Downs, general sales manager, stated that the plant will manufacture Solventol metal cleaning and spray washing equipment to be used in conjunction with Solventol di-phase metal cleaning compounds.

Powerful, direct-connected (no gears), 3450 r.p.m., 100-120 v AC air-cooled motor. All sealed ball-bearing construction. Die-cast aluminum housing, polished. All-position handles. In hand weight only 5 lbs. Insulated with ground wire for wet as well as dry sanding or rubbing. Available accessories—deep contour pads, surface plates, felts, etc. Takes any sheet abrasives—3 covers 4½" x 6½" from standard 9" x 11" sheet.

A time saving quality tool priced so every worker can have one.

Write for Circular

SpeedWay MANUFACTURING CO.
1895 So. 52nd Ave., Cicero 50, Ill.

NU-MATIC GRINDERS, INC., has moved from Detroit, Mich., to 8224 Carnegie Ave., Cleveland 3, Ohio. The concern is being managed by Arthur Raske, executive vice president. Newly appointed, he was formerly district sales manager of The Brush Development Company, Cleveland.

Arthur Raske

Founded three years ago by two Detroit business men, Nu-Matic Grinders, Inc., markets a grinder head consisting of a pneumatic rubber drum that can be inflated to low air pressure. Its chief benefits are: it will grind, polish, and buff irregular and contour surfaces (as well as flat surfaces), and produce a hand finish quickly and economically.

A patent covering the coating of metallic articles with vinyl plastisols has been issued to John W. Donnell and Kenneth Tator and assigned to **INDUSTRIAL LINING ENGINEERS, INC.**, Pittsburgh 1, Pa. Entitled "Method of Coating Metallic Articles with Vinyl Resin Dispersions", the patent will be made available to coaters of plating racks, tanks, and other articles, by means of a licensing arrangement.

BEDE PRODUCTS, INC., Cleveland, Ohio, manufacturer of the Bede Paint Heater and other hot spray equipment, has established a Chicago branch office and new stocking distributors in New York and Cleveland. This expansion will round out a sales and service group which can assist manufacturers in all parts of the Continental United States and Canada. Located at 30 W. Washington St., Chicago 2, the Bede Products branch office will be under the direction of Harold C. Fornwall, district sales manager. Mr. Fornwall, who has had many years of finishing experience with one of the leading spray equipment manufacturers, will be assisted by Joseph Fasulo and S. S. Baker.

Distributor for New York City and Long

New! BLACK OXIDE PROCESS for STEEL and IRON

BLACK MAGIC (TYPE A)
Pat. Pending

Our long and varied experience in the blackening field with our well-known and proven BLACK MAGIC blackening processes, has brought out the fact that there was a need for a one-bath blackening solution which would not only produce an attractive black finish, but that the finish should have more corrosion resistance, operate at a lower temperature to decrease the dragout of solution, blacken heat-treated parts easily, be self-rectifying to inhibit the build-up in the solution of red iron oxide and counteract contaminants such as copper, zinc, etc., which frequently are introduced into the blackening solution; also, that the blackening solution in use should remain in chemical balance and new additions of salt be made by adding the required quantities of one chemically balanced salt. With these characteristics of a blackening bath in mind, the new BLACK MAGIC formula was developed.

★ **Easily blackens heat treated parts.** BLACK MAGIC Type A overcomes the difficulties normally present in applying a black oxide finish to cyanide hardened pieces, which have been oil quenched, and carbo-nitrided parts.

★ **One bath! One salt!** BLACK MAGIC Type A blackening process requires only 1 bath. The same salt mixture that makes up the initial solution is used to replenish dragout losses, thus maintaining at all times a true, chemically balanced BLACK MAGIC solution. Only 6½ lbs. of BLACK MAGIC salts are required to make up each gallon of solution.

★ **Lower operating temperature.** BLACK MAGIC Type A solution is operated at a boiling point of only 290° F. This substantially decreases the amount of dragout and effects important savings in heat consumption. The higher fluidity of the BLACK MAGIC solution lowers operating costs considerably.

★ **Self rectifying.** BLACK MAGIC Type A overcomes the normal tendency in black oxide processes to build up red iron oxide in colloidal form which eventually clings to the processed work. BLACK MAGIC is so formulated to be self rectifying and under normal and many abnormal conditions will keep the bath in excellent operating condition at all times.

★ **Faster blackening cycle.** Production baths of BLACK MAGIC Type A show a decrease in the blackening time cycles of from 15 to 20%. This is an important factor in speed up in production and lower cost of operation.

★ **More corrosion resistant.** BLACK MAGIC Type A has high absorption and adsorption qualities for oils and waxes normally used as a final finish dip. This characteristic gives infinitely higher corrosion resistant qualities to the finished parts.

Write for Bulletin MB-3

Send items of your own manufacture for sample processing.

THE MITCHELL-BRADFORD CHEMICAL CO.
2446D Main St. Stratford, Connecticut

Sales and Technical Service also available at our Chicago office: 7001 North Clark. Representatives in all leading cities.

Mitchell-Bradford

QUALITY PRODUCTS OF CHEMICAL RESEARCH

Island is the Luis Winston Co., 431 W. 33rd St., New York 1, N. Y. Headed by M. J. Lee, president, the Winston Company will maintain complete stocks of Bede paint heaters.

R. W. Renton & Co., Inc., 877 Addison Rd., Cleveland, Ohio, headed by R. W. Renton, president, will offer a complete line of Bede equipment as well as technical aid and service.

The **CHROMATONE CORPORATION** has been established for the manufacture and marketing of nationally-known Chromatone ready-mixed silver, gold and bronze finishes and Chromatone decorator synthetic enamels in a full range of brilliant basic colors. The corporation has headquarters at 1527 Grande Vista Ave., Los Angeles, Calif., with a branch factory and warehouse at 9270 Olive Street Rd., St. Louis 5, Missouri.

Formation of the **NORTON DISTRIBUTORS' ADVISORY COUNCIL,** composed of representatives of eleven Norton abrasive distributors from Connecticut to California, has been announced by Ralph M. Johnson, vice president in charge of sales, Abrasive Division of the **NORTON COMPANY.**

Believed to be the first of its kind in the abrasive industry, the Norton Distributors' Advisory Council has been organized in an effort to obtain the benefit of the experience of representative distributor men in order that the company, with the help of its distributors, can improve the selling job it is doing.

Membership in the council will vary from one to three years. Although advisory in name, its deliberations will be of great help in formulating new policies and making changes in old ones. Members of this first advisory group include: Howard B. Begg, general manager and treasurer, Squier, Schilling and Skiff, Inc., Newark, N. J.; Howard J. Behn, president, H. J. Behn and Co., Inc., Bridgeport, Conn.; Lewis W. Gilbert, president, Screw Machine Supply Co., Chicago, Ill.; Lloyd B. Mize, president, Industrial Supply Corp., Richmond, Va.; J. D. Nicholson, general manager, The Mine and Smelter Supply Co., Denver, Colo.; J. Stewart Plowden, president, Plowden Supply Co., Houston, Tex.; Wilson W. Radcliffe, president, The E. A. Kinsey Co., Cincinnati, Ohio; Russell

WOOD TANKS

Built to Specifications

66
YEARS OF
TANK BUILDING
SERVICE

Plating and pickling tanks built to your specifications is a Kalamazoo specialty — any size or shape — fir, oak, cypress or redwood.

Tanks on left were made for large manufacturer of automobiles. They are 88" x 64" x 62" — made of 8" long-leaf yellow pine with B & M anti-acid metal tie rods.

Write today for estimates and suggestions.

Kalamazoo TANK AND SILO COMPANY

628 HARRISON ST. • KALAMAZOO, MICH.

Start Clean... *Stay* Clean!

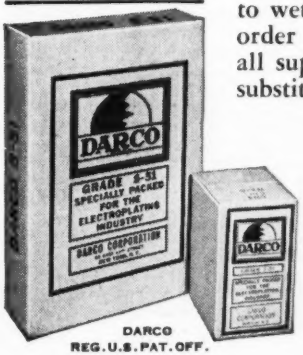
Smart man! He's tubbed, scrubbed, and starched—and he's making sure he *stays* clean. Smart platers make sure their work *stays* clean . . . never risk all the time, labor, and expense of preparing work for plating by putting the metal into a bath of questionable purity.

Start clean . . . *stay* clean! Red Label Darco S-51 adsorbs the impurities that cause trouble in plating baths . . . takes them out of the bath before they can be deposited on the freshly cleaned surface of your work.

Red Label Darco helps you save on scarce metals . . . helps you do a better job with thinner deposits and minimize rejects.

With clean metal... keep the Bath Clean

Red Label Darco S-51 is especially treated for use in plating—the only carbon that meets the benzol-mercury test! It is especially easy to handle . . . easy to wet . . . easy to make into a slurry. Place your order for Red Label Darco S-51 today. Practically all suppliers carry Darco in stock, so don't accept substitutes.



DARCO DEPARTMENT

ATLAS POWDER COMPANY

Darco General Sales Offices

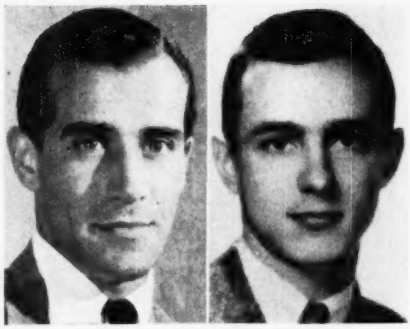
60 East 42nd Street, New York 17, N. Y.

Rising, vice president, Ducommun Metals and Supply Co., Los Angeles, Calif.; Harry E. Ruhf, president, Cleveland Tool and Supply Co., Cleveland, Ohio; Miles I. Stray, president, Chas. A. Templeton, Inc., Waterbury, Conn.; Harold E. Torrell, vice president, Syracuse Supply Co., Syracuse, New York.

Norton Company members are: Ralph M. Johnson, vice president in charge of sales, Abrasive Division; George A. Park, sales manager, Eastern region; Fred L. Curtis, sales manager, Western region; Donald L. Price, sales manager, Central region; William E. Shumway, manager, sales engineering; C. John Sundberg, manager, Worcester sales office; Robert H. Cannon, merchandising engineer (all of the Abrasive Division); and C. Leonard Shaw, publicity manager.

NEW POSITIONS

Theodore L. Brantly, Jr., president of The Cro-Plate Co., Inc., Hartford, Conn., industrial chrome plating organization and manufacturer of metal plating and finishing equipment, has announced the appointment of **ROBERT C. ALLEN** as



Alan R. Burman (left), Robert C. Allen

treasurer and **ALAN R. BURMAN** as vice president.

Mr. Allen, a C.P.A., was formerly a resident manager and senior consultant at Miller, Morgan & Co., Pittsburgh, Pa., specializing in corporative structure, audits and taxation for several leading manufacturers in the New England area. He is a graduate of American International College and holds a master's degree in business administration from Boston University.

Mr. Burman comes to The Cro-Plate Company from Wilson, Haight & Welch, Inc., Hartford advertising agency where he served as account executive and copy chief. In his new position he will be concerned with the organization of a department in charge of advertising and sales which he will head.

Apothecaries Hall Co., Waterbury, Conn., manufacturer and distributor of plating supplies and equipment, has announced the promotion of **FREDERICK S. FOSTER** to the position of assistant to the vice president. He will be in charge of purchasing and sales promotion of the company's heavy chemical and plating supply departments, and will also have certain administrative responsibilities.

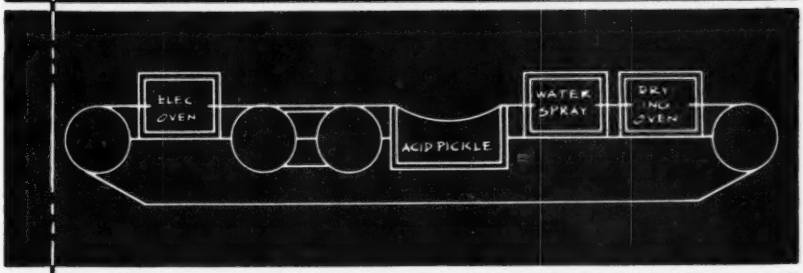
A 1932 graduate of DePauw University, Mr. Foster has been associated with Apothecaries Hall since 1934, following post graduate work at Colgate University. He has worked in the company's analytical and research laboratory, and was in charge of allocations and priorities. For seven years he has been in the sales department, and since 1945 has served in the capacity of sales engineer.

FORM-A-ROC
FIRST-COAT
FOUNDATION
FOR FINE FINISH

1. Dries with lacquer speed.
2. Has double lacquer solids at spray gun.
3. Fills very well—sands easily.
4. Adheres tenaciously to steel, wood, presdwood, aluminum, galvanized metal, etc.
5. Holds out lacquer, synthetic or oleoresinous enamels exceptionally well.
6. Thins 3:1 with xylol.
7. Available in GREY, SALMON and OFF-WHITE.
8. Ground well to smooth texture.

MADE BY
The Varnish Products Company
5208 Harvard Avenue Cleveland, Ohio

NO MANPOWER PROBLEMS HERE



4-STATION WIRE BELT CUTS HANDLING COSTS IN HALF, BOOSTS OUTPUT 25 TIMES! In this specially designed installation, one woven wire conveyor belt carries metal dial faces through the four steps shown, in a continuous straight-line operation prior to porcelain enameling. Stainless steel used in constructing the belt will not form heat scale, resists corrosion from both the acid bath and the water rinse. Open mesh of the wire belt allows free heat circulation at end stations, free drainage of pickling solution and rinse water. Retaining cleats attached to the belt hold the dials in a vertical position, thus allowing maximum utilization of the belt surface.

The results? 2 Operators can now produce over 100,000 parts in the time 4 operators formerly required to produce only 4000 parts!

Perhaps you could speed production by combining product movement with processing on a woven wire belt. Why not call in your Cambridge field engineer today and let him explain all the advantages of . . .

Cambridge Woven Wire Conveyor Belts

Write direct or call your nearest Cambridge office. See "Belting, Mechanical" in your classified telephone directory.

FREE CONVEYOR BELT MANUAL gives woven wire belt design, specifications and construction. Also contains valuable installation diagrams and metallurgical data. Write for your copy of this valuable reference.

The Cambridge Wire Cloth Co.

WIRE CLOTH | METAL CONVEYOR BELTS | SPECIAL METAL FABRICATIONS

Department A
Cambridge 6,
Maryland

OFFICES IN PRINCIPAL INDUSTRIAL CITIES

A. C. TOWNE, JR. was recently elected president of the Michigan Oven Company. Mr. Towne was one of the founders, and has been the Buffalo district manager since the incorporation of the company. He has also served as a member of the board of directors.

Mr. Towne has appointed **WILLIAM JARVIS** as general manager. Mr. Jarvis formerly was associated with Young Brothers Company as chief draftsman, and has spent the past seven years as chief engineer of Detroit Sheet Metal Company.

Five abrasive engineers have been transferred to new territories, according to an announcement by Ralph M. Johnson, vice president in charge of sales, Norton Co., Worcester 6, Massachusetts.

SIDNEY B. WETHERHEAD, previously covering Maine, New Hampshire, and Vermont, has been assigned to the eastern Massachusetts territory to assist Raymond J. Forkey, abrasive engineer in that area.

CHARLES A. BABBITT, formerly serving North Carolina and Virginia, will take over the Maine, New Hampshire, and Vermont territory to succeed Mr. Wetherhead. He will operate under the direction of Fred W. Elya, Northeastern district manager.

RICHARD D. BURDETTE has been appointed abrasive engineer. He will succeed Mr. Babbitt in the North Carolina and Virginia area, and will work under the direction of Leroy K. Behr, district manager.

JOHN R. H. TRUELSEN, formerly responsible for southern Wisconsin, has assumed responsibility of northern Illinois. He will continue to operate under the direction of Raymond E. Taylor, Chicago district manager.

F. DONALD WING, field engineer in Chicago, has been appointed abrasive engineer. He is to assume the responsibility of southern Wisconsin to succeed John R. H. Truelsen, and will also work under the direction of Raymond E. Taylor.

The Pennsylvania Salt Manufacturing Company has appointed **G. A. NELSON** works manager of the Wyandotte, Michigan works, and **JAMES M. McWHIRTER** works manager of the company's Southern plants, it was announced by William F. Mitchell, vice president.

The new positions were created in line with the company's current expansion plans. Mr. Nelson was formerly superintendent at Wyandotte and will combine these duties with those of his new position. Mr. McWhirter, formerly superintendent at Calvert City, Kentucky, will be responsible for operations at that plant and at Montgomery, Alabama, and Bryan, Texas.

At the same time Mr. Mitchell announced that **RITNER W. TOMLINSON,** formerly superintendent of the company's plant at Cornwells Heights, Pennsylvania, has been appointed superintendent at Calvert City, and **HERMAN J. EICHENHOFER,** formerly assistant superintendent for processes at Wyandotte, has been appointed superintendent at Cornwells Heights.

FRANCIS E. MURPHY, formerly Wyandotte production supervisor, has been appointed assistant superintendent, processes, to replace Mr. Eichenhofer. Mr. Eichenhofer will work with the company's Central Engineering Department in Philadelphia for the balance of 1951 on the development of new processes. **JOSEPH T. GORMALLY,** previously with the Philadelphia office, has been appointed assistant superintendent at Cornwells Heights and will be acting superintendent until Mr. Eichenhofer assumes his duties there full time.

FELT DOES IT BETTER

Paramount Brand

FELT WHEELS

Superior for Polishing and Buffing

When you order FELT WHEELS specify PARAMOUNT BRAND FELT WHEELS for top quality and uniformity.

BACON FELT CO. WINCHESTER, MASS.

Established 1824

"America's Oldest Felt Manufacturer"

Send for our Complete Catalog

STOP OFF

NEW MASK TYPE CAN BE USED OVER AND OVER

A new material and a new process for selective plating in Copper, hard Chrome, or in the anodizing of Aluminum.

Simple, quick action semi-permanent masks which can be used repeatedly, with a life of 100 to 500 cycles depending on kind of plating and care in handling.

Great savings in time, labor and cost. Just place the mask in position on the work, secure, and run. Then remove and place on the next piece.

BUNATOL Stop Off Masks are made to fit the job, of flexible and extremely tough material. Will withstand all plating solutions and cleaners, but not the degreaser. In most cases the mask can be removed and placed on the next piece in a matter of minutes.

If you are interested send us sample part with the stopped off areas plainly marked. We will quote on making the mask if the part lends itself to this process. No obligation and parts will be returned promptly.

NELSON J. QUINN COMPANY TOLEDO 7, OHIO

— for 15 years —

Rack Insulation Exclusively

E. NELMES THOMAS has been appointed assistant manager of the sales promotion division of Commercial Solvents Corporation, it has been announced by H. J. Henry, vice president in charge of sales.

Mr. Thomas became associated with Commercial Solvents in 1946 as a technical writer.

FRED C. BOYCE was re-elected president of the D. J. Murray Manufacturing Co., Wausau, Wis., to serve his eighteenth consecutive year as president. Other officers elected were **A. W. PLIER,** executive vice president and general manager; **M. P. McCULLOUGH** and **D. C. EVEREST,** vice presidents; **C. L. DURKEE,** vice president and sales manager; **GEORGE L. RUDER,** treasurer; **W. A. MARQUARDT,** secretary. Re-elected as assistant treasurer was **GROVER KEETH** and as assistant scretary, **P. W. HOEPER.**

At the annual stockholders' meeting Messrs. Boyce, Everest, and McCullough were re-elected for the thirtieth consecutive year as directors. Other directors re-elected were Messrs. Plier, Hoeper, Keeth, Ruder, and Durkee.

Watson-Standard
PRESCRIPTION FINISHES
Compounded especially for
METAL DECORATORS
Give us your finishing problem.
We guarantee you an answer
based on your conditions, and
not just a standardized formula.
WATSON-STANDARD CO.
225 Galveston Ave, Pittsburgh 30, Pa.
N. Y. Office 15 Park Row, New York 7, N. Y.
Chicago Office 55 E Washington St Chicago 2, Ill.

WILIAM F. CLEMONS has been named sales engineer for the Udylite Corporation's Cincinnati territory which covers southern Ohio, L. V. Nagle, vice president in charge of sales, has announced.

William F. Clemons

A graduate of Lawrence Institute of Technology in Detroit, where he received a degree in chemical engineering, Mr. Clemons has a thorough schooling and experience in every phase of electroplating. Upon graduation, he joined The Udylite Corporation as a control-chemist in the Customer Service Laboratory where customers' plating solutions and methods are tested and analyzed. He later was assigned to Udylite's field technical staff. Immediately prior to his appointment to the Cincinnati office, he was a member of the sales department in the Detroit area.

E. T. ASPLUNDH has been named president of Southern Alkali Corporation, a wholly-owned subsidiary of Pittsburgh Plate Glass Company.

Associated with Pittsburgh Plate Glass Company's chemical operations since 1919, Mr. Asplundh has served as vice president in charge of Pittsburgh's Columbia Chemical Division since 1940 and as vice president of Southern Alkali Corporation since 1944.

CLARENCE M. BROWN, board chairman of Pittsburgh Plate Glass Company since 1931 and a member of Southern Alkali's board of directors since the subsidiary's incorporation in that year, has been named chairman of Southern's board of directors.

Also continuing as directors of Southern Alkali Corporation are **HARRY B. HIGGINS, HAROLD F. PITCAIRN, RAYMOND PITCAIRN,** and **DWIGHT MEANS.** Mr. Higgins will serve as chairman of the executive committee and Mr. Means as a vice president.

New directors and officers are **LELAND HAZARD,** vice president and general counsel, and **W. I. GALLIHER,** vice president. Additional directors are **RICHARD B. TUCKER** and **E. D. GRIFFIN.**

Harshaw

cadmium fluoborate plating solution

ADVANTAGES

1. Simple make-up and control
2. High plating speeds
3. Anode and cathode efficiencies approximately 100%
4. Decided reduction of hydrogen embrittlement of hardened steel

SOLUTION COMPOSITION (TYPICAL)

Cadmium Fluoborate	32 oz/gal
Cadmium	12.5 oz/gal
Free Boric Acid	3.0 oz/gal
Ammonium Fluoborate	8.0 oz/gal
Addition Agent	As required

OPERATING CONDITIONS

pH (Colorimetric)	4.0—5.0
Temperature	75°—100° F
Current Density	20—70 AMP./sq.ft.
Agitation	As required (mechanical or air)

BATH MAKE-UP

Bath prepared by dilution of concentrate, containing about 42 oz/gal Cadmium, then adding Ammonium Fluoborate as indicated. The pH is raised with Ammonia Water or lowered with Fluoboric Acid.

EQUIPMENT

Tanks: Rubber lined steel or approved synthetic materials

Barrel Cylinders: Bakelite or hard rubber.

THE HARSHAW CHEMICAL CO.
1945 East 97th Street, Cleveland 6, Ohio
BRANCHES IN PRINCIPAL CITIES

For prompt action contact the Harshaw Sales Office nearest you: 505 North La Salle St., Chicago 10, Ill. • 611 American Bldg., Cincinnati 2, Ohio • 1945 East 97th Street, Cleveland 6, Ohio • 9240 Hubbell Ave., Detroit 28, Mich. • 6622 Supply Row, Houston 11, Texas • 3237 South Garfield Ave., Los Angeles 22, California • 420 Lexington Ave., New York 17, New York • Jackson & Swanson Sts., Philadelphia 48, Pa. • 7th and Carson Sts., Pittsburgh 3, Pa.

ROBERT WIER III and **EMERSON L. MORRIS** have joined the buying staff of the Purchasing Department of Hercules Powder Co., Wilmington, Del., L. J. Finnan, Jr., director of purchases, has announced.

Mr. Wier has been assistant product supervisor of the company's Chicago sales office. Mr. Morris has been supervisor of purchases in the cellulose products plant at Hopewell, Virginia.

Fred H. Haggerson, president of Union Carbide and Carbon Corp., New York, N. Y., has announced the election of **MORSE G. DIAL** as executive vice president and **DR. GEORGE O. CURME, JR.**, as vice president in charge of research.

Mr. Dial, a graduate of Cornell University, joined the corporation in 1929 as a member of the sales staff of Carbide and Carbon Chemicals Corporation. Since 1949 he has been director, vice president, and treasurer of Union Carbide and Carbon Corporation.

Dr. Curme will now head all the research activities of Union Carbide. A pioneer in research, his work resulted in the formation of Carbide and Carbon Chemicals Corporation. He is the recipient of many medals in recognition of his achievements in chemistry, and is an active member of the American Chemical Society, the American Institute of Chemical Engineers, the American Association for the Advancement of Science, the Society of Chemical Industry, The New York Academy of Sciences, the Chemists Club of New York, and the National Academy of Sciences.

Appointment of **THEODORE J. MITCHELL** as industrial sales manager of the Finishes Division of the Du Pont Company in the Chicago region has been announced.

Mr. Mitchell joined Du Pont at Tulsa, Oklahoma, in 1926, and has spent much time dealing with paint problems of the aviation and railway industries. He was made regional transportation sales manager at Chicago in 1945, assistant regional industrial sales manager there in 1948, and went to San Francisco in July 1949 as regional industrial sales manager. In his new position in Chicago he succeeds **WHITNEY S. ROBERTSON,** who was promoted to assistant manager of industrial sales of the Finishes Division in Wilmington.

Wesley S. Block, Jr., president of Richardson-Allen Corp., College Point, Long Island, N. Y., manufacturer of selenium rectifiers, has announced the appointment of **DR. HARRY N. WALKER** as vice president in charge of sales. He has been a director of the company for some time.

Before joining Richardson-Allen, he was general sales manager of the B. G. Corporation, and prior to World War II had been professor and chairman of the Department of Electrical Engineering at New York University.

HONORS

RUSSELL H. DUNHAM, first president and first chairman of the board of Hercules Powder Company, was honored recently for his leadership in the creation of the company's research laboratories in Wilmington, Delaware, in 1930. The ceremonies took place at a luncheon at the Hercules Country Club and marked the twentieth anniversary of the opening of the Hercules Experiment station.

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Many manufacturers used *Du-Lite finish for World War II production parts finishing. And today millions of steel parts for aircraft, guns, instruments, and all kinds of equipment are being finished with *Du-Lite Black, and for good reason.

The *Du-Lite Black Oxide Process is trouble free and dependable on large, steady-flow parts finishing. Perfect results can be achieved by ordinary workers. Furthermore *Du-Lite has the field organization to meet finishing problems as they arise, recommend proper procedures, supervise installations, train your workers, and follow through with prompt delivery of materials.

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Attending the luncheon were Charles A. Higgins, president, members of the board of directors, departmental executives, and representatives from the Experiment Station.

Dr. Emil Ott, director of research, presided over the ceremonies. Dr. Robert Cairns, assistant director of research, presented Mr. Dunham with a group of three photographs as a memento of the opening of the Experiment Station.

Dr. Raymond F. Schultz, director of the Station, then presented Mr. Dunham with a testimonial signed by all 700 members of the Research Department and also by the Country Club staff.

Mr. Dunham took office as the first president of Hercules late in 1912 when the newly-organized company began functioning. Although he resigned as company president in 1939, he remained chairman of the board of directors until June 1944. He continues to serve as a director of the company, and as chairman of the finance committee.

SOCIETIES

The **PORCELAIN ENAMEL INSTITUTE'S** investigation of sub-contracting possibilities for porcelain enamelers is being expanded, according to a spokesman for the Institute's Government Business Committee. The study includes the practicability of converting existing facilities for defense work not directly related to enameling, as well as developing increased use of porcelain enamel parts for defense work.

One possibility being given particular attention, PEI states, is the forming or fabrication of metal parts. Most porcelain enamelers have extensive metalworking and welding setups as well as the necessary skilled personnel, and could convert to defense work with a minimum of delay.

As a practical example of this type of contribution to defense, PEI points to the recently expanded Aircraft Division of Texlite, Inc., Dallas, Texas. This Southwestern porcelain enameling company now is assisting Consolidated Vultee in defense plane production by stretch-forming aluminum sections for B-36 stabilizers, then assembling the stabilizers on a main assembly jig built and furnished by Consolidated.

The **ANNUAL EDUCATIONAL MEETING** and **BANQUET** of the **MILWAUKEE BRANCH, AMERICAN ELECTROPLATERS' SOCIETY,** was held April 28 at the Schroeder Hotel.

For the educational session a program to comply with conditions of the times was arranged and entitled "A Defense Clinic."

Leslie Diveley, president of the Milwaukee Branch, opened the meeting and welcomed all the members and guests. He then introduced Vincent Mattacotti who acted as chairman of the educational session.

Mr. Mattacotti introduced Dr. William Blum of the National Bureau of Standards as first speaker. In his talk, entitled "Effects of War on the Electroplating Industry," Dr. Blum reviewed the various metals used by electroplaters and pointed out the current needs for these materials in various phases of mili-

Use of organic finishes instead of plating was discussed by B. F. Ames, General Sales Manager, Maas & Waldstein Co., at a recent meeting of the Rochester Branch, American Electroplaters' Society. Left to right: W. C. Treadwell, M & W Technical Service Engineer; John Duford, Eastman Kodak; Mr. Ames; Joseph Hull, Eastman Kodak; Walter F. Swanton, Pfaudler Company; R. Flint, Ritter Company; W. Howard, Bausch and Lomb Optical Company.

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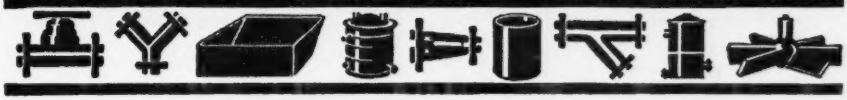

Fig. 1—Seventy members and guests assembled for a Speakers' Luncheon preceding the educational program. At the speakers' table (far end of room) may be seen (left to right): A.E.S. President William J. Neill, Myron B. Diggin, Vincent Mattacotti, Dr. William Blum, Carroll O. Hutchinson, Milwaukee Branch President Leslie Diveley.

tary production. Uses for some of the metals by electroplaters include cadmium plating on airplane parts, hard chromium plating on gun barrels and porous chromium plating on aircraft engine cylinders, silver and gold plating on radar parts, tin plating as a substitute for hot dip tinning, nickel and chromium plating on surgical instruments, and iron plating instead of nickel and copper in the printing industry.

Dr. Blum reviewed, by means of charts, the consumption of metals during the year 1948, showing the percentages used in the plating industry. With the exception of silver, cadmium, tin, and nickel, all other metals plated amounted to around one per cent of the total amount of the metal used in each case. Dr. Blum also pointed out how nickel plating had increased from 7 per cent of the total nickel consumed in 1940 to 22 per cent during 1949. Of the nickel plated, the automobile industry consumed 62 per cent in 1949. Other industries used much smaller amounts.

Dr. Blum emphasized the need for platers to get Defense Orders in order to stay in business. He mentioned one or two applications in which the thickness of plating could be reduced without affecting the quality of the finished product too much, but he cautioned the group that plating thickness should not be reduced to the point that the Electroplating Industry would be given a bad name by reason of deposit failures.

The second speaker, Carroll O. Hutchinson, Technical Service Director, Nubian Division, The Glidden Co., Chicago, Ill., presented the subject, "Conversion Coatings and Specification Finishes." The speaker discussed metal preparation, pointing out that no finish system is better than the metal preparation used, and that there is more possibility for improvement in metal preparation than in the paint which is applied to the metal surface. Mr. Hutchinson described a number of Government specification coatings for various branches of the Armed Services. The paper was illustrated with a number of slides illustrating the points stressed by the speaker.

The third speaker on the program was Myron B. Diggin, Technical Director, Hanson-Van Winkle-Munning Co., Matawan, N. J., who presented an outstanding talk on the subject, "Plating to Meet Today's Conditions." The first section of his talk described substitute deposits and trends. This presentation was most heartening since it showed that there are so many ways in which electroplaters can select alternate finishing methods to see them through this period of shortage and restriction in the use of metals with which they are familiar.

Among trends mentioned by Mr. Diggin were the shift from a nickel-chromium system to zinc plating plus a final lacquer, or to chromium direct over bright zinc either as deposited or as buffed. Another substitute for the nickel-chromium system is that of chromium direct over copper, followed by two baked

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Fig. 2—Dr. Blum finds a humorous note in his talk on "The Effects of War Upon the Electroplating Industry."

synthetic coatings. Zinc die castings have been copper plated, and chromium plated direct over the copper successfully. Mr. Diggin pointed out how the use of periodic reverse in connection with copper plating enables the electroplater to use his copper for its protective value, without losing it in the buffing operation which would otherwise be necessary. The speaker showed examples of some of the electroplated finishes described in his talk, as can be noted in the accompanying illustration.

Mr. Diggin described a number of finishes used on alloy steel wrenches. These included chromium direct, chromium over an iron flash, bright zinc, bright zinc plus a chromate bright dip, silver, silver over a copper flash, alkaline black oxide plus a wax emulsion finish.

While gold is ordinarily considered a finish suitable only for jewelry or other specialized applications, Mr. Diggin pointed out that it could serve as a substitute finish on metal furniture, for example, followed by a baked clear organic coating or a gold tinted lacquer.

In the field of alloy plating the speaker mentioned the tin-zinc alloy used as a substitute for cadmium. Other alloys mentioned included a tin-lead alloy, an antimony, or antimony alloy for corrosion resistance.

In the field of light metals, anodizing of aluminum by both the sulfuric acid process and chromic acid process may be used with the variation of a shorter anodizing period, followed by a dip in a colored dye, and use as such or after a final lacquer coating. A new die casting alloy was described, its advantage being that it retains a light color during anodizing. Cadmium plating on aluminum, and chemical dips to increase the corrosion resistance of the aluminum surface were described. Hard chromium plating

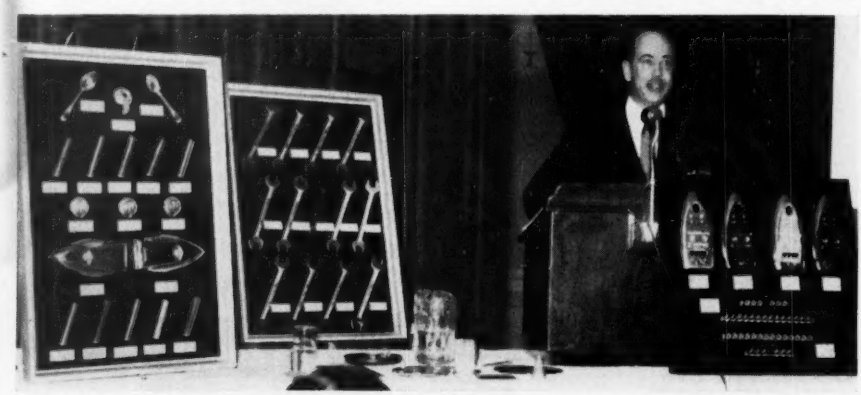

Fig. 3—Myron B. Diggin in his talk, "Plating to Meet Today's Conditions," illustrated his points by actual examples of several articles plated with the substitute finishes. In this way electroplaters attending the meeting were able to see the exact appearance of parts plated with various finishes.

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Already circulated to more electroplaters and allied trade readers than *any other* publication, extra copies of July PRODUCTS FINISHING will be distributed at the Convention. This is an extra bonus to advertisers. PRODUCTS FINISHING regularly goes to a total circulation of more than 18,000.

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Fig. 4—The speakers assembled with the chairman for the question - and - answer period: (left to right) Myron B. Diggin, technical director, Hanson-Van Winkle - Munning Co., Matawan, N. J.; C. O. Hutchinson, technical director, Nubian Division, The Glidden Co., Chicago, Ill.; Vincent Mattacotti, chairman of the educational session; Dr. William Blum, National Bureau of Standards.
(PRODUCTS FINISHING Staff Photos)

on aluminum to the extent of 0.05 inch was also described.

Magnesium parts can be anodized (the Manodyz Process) or treated with various surface conversion coatings.

Lack of time prevented the speaker from discussing the other two parts of his talk, "Substitutes for Scarce Chemicals" and "Solution Conservation."

All the speakers were called back for

(Left) Walter Denney, past president of the Columbus Branch, A.E.S., presents Branch Charter and specially constructed gavel to J. Edwin Bride, president-elect.

(Below) At May 4 meeting of Columbus Branch, A.E.S. Supreme President Wm. J. Neill installs new Branch officers. (Left to right) W. J. Neill; J. Edwin Bride, president; Nathan L. Koslin, first vice president; John Beach, board of managers; Wilbur C. Hespenheide, second vice president; William Balzer, board of managers; Richard Jager, librarian; Walter Denney, board of managers.

(PRODUCTS FINISHING Staff Photos)

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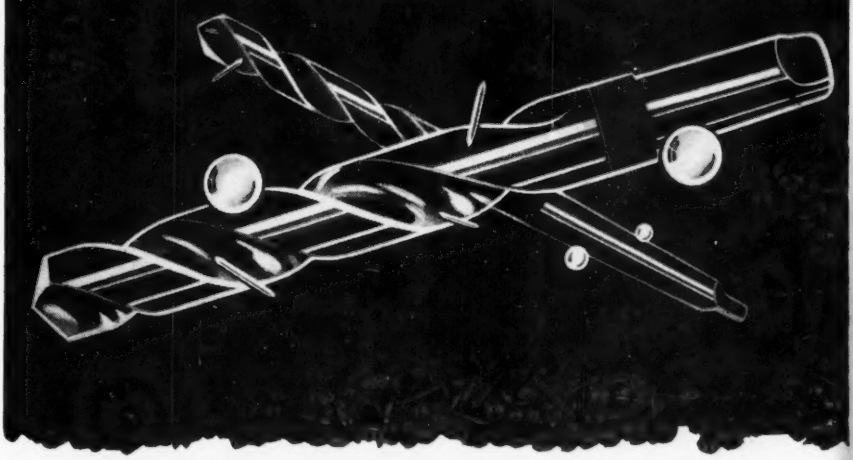

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an extended question-and-answer period.

During the discussion period, Leonard Weeg, National Lock Company, commented on a recent visit of representatives of the National Association of Metal Finishers with the Senate Committee on Small Business. The current problems of the electroplater were presented to the Senate Committee, and Mr. Weeg reported that the attitude of the Committee was most heartening, and that they promised to investigate possibilities for relieving the present critical situation in the electroplating industry. The NAMF groups stressed the desirability of keeping the civilian economy healthy so that the defense effort could be financed.

The banquet and social program following the educational session were of the high quality which electroplaters have learned to expect from the Milwaukee Branch. Approximately 500 members and guests attended the banquet and the floor show which followed.

The meeting attracted a great number of visitors from Chicago, Rockford, Grand Rapids, Detroit, Cincinnati, and other cities. Perhaps the record for long distance travel to attend the meeting is held by Thomas F. O'Brien, MacDermid, Inc., Waterbury, Connecticut.

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meetings

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June 4-6. Nineteenth Annual Convention and Exhibit, Institute of Cooking and Heating Appliance Manufacturers, Netherland Plaza Hotel, Cincinnati, Ohio.

June 18-22. Annual Meeting, American Society for Testing Materials, Atlantic City, New Jersey.

July 30-Aug. 2. 38th Annual Convention, American Electroplaters' Society, Statler Hotel, Buffalo, New York.

Sept. 3-7. Diamond Jubilee Meeting, American Chemical Society, New York, New York.

Sept. 10-14. Sixth National Instrument Conference and Exhibit, Instrument Society of America, San Houston Coliseum, Houston, Texas.

Oct. 10-13. Fall Conference, The Electrochemical Society, Statler Hotel, Detroit, Michigan.

Oct. 18-20. South Central Regional Meeting, National Association of Corrosion Engineers, Corpus Christi, Texas.

Oct. 23-25. 54th Annual Convention, International Association of Electrotypers & Stereotypers, Hotel Kenmore, Boston, Massachusetts.

Oct. 29-31. 63rd Annual Convention, National Paint, Varnish and Lacquer Association, Chalfonte-Haddon Hall, Atlantic City, New Jersey.

Nov. 1-3. 29th Annual Meeting, Federation of Paint and Varnish Production Clubs, Chalfonte-Haddon Hall, Atlantic City, New Jersey.

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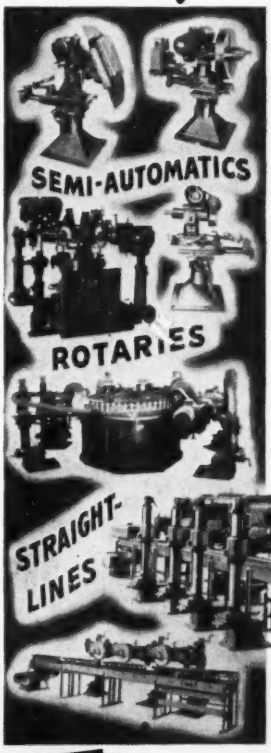
Polishing and Buffing Machines



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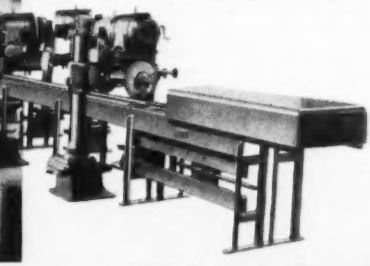
It depends . . . on the size, shape and material of the part you want to finish; on production required; on plant space and layout. ACME Automatics include Straight-lines, Indexing and Continuous Rotaries, with or without spindles, Semi-Automatics and Special Machines. These machines are built in a variety of types and sizes and may be equipped with varied special fixtures and accessory equipment to meet the conditions involved in your specific job. ACME Automatics have proved their efficiency in production for nearly half a century. Progressive ACME experience in this specialized field is a substantial assurance of lower production cost and dependability under production operation in your plant.



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Dr. William Blum (right) is presented with honorary membership in the Electrodepositors' Technical Society (British) by Dr. Wernick, executive secretary of that Society.

To the **DETROIT BRANCH** of the **A.E.S.** fell the high honor of acting as host to Dr. William Blum of the National Bureau of Standards on the occasion of the presentation to him by Dr. S. Wernick, executive secretary of the British Electrodepositors' Technical Society, of honorary membership in that body. The special meeting of the Detroit Branch, held on May 18 in the Hotel Statler, was attended by members and guests from a number of other A.E.S. Branches. William J. Neill, president of the American Electroplaters' Society, was also a guest of honor.

Walter Pinner of the Detroit Branch also received an honorary membership in the British Society from Dr. Wernick. Mr. Pinner presented to William J. Neill, president of the A.E.S., a certificate of honorary membership in that famous "Knights of the Pot" group, which consists of past A.E.S. supreme presidents.

For the technical part of the program, Dr. Wernick presented an interesting paper on "British Electroplating Practice." He also showed a film entitled "Roto Dipping Car Bodies." W. M. Phillips, electroplating head of General Motors Research Laboratories, spoke on "Current U. S. Plating Practice."

NECROLOGY

DAVID C. BALL, organizer and chairman of the board of directors of Oakite Products, Inc., New York, N. Y., died March 23 at his home in Lake Placid, New York, at the age of 93.

In 1909 Mr. Ball organized the Oakley Chemical Company for the manufacture and servicing of industrial cleaning materials to the nation's industries, and later became its president. In 1926 the name of the company was changed to Oakite Products, Inc.

Mr. Ball became chairman of the board of directors in 1949, which office he held at the time of his death.

(Below left) Walter Pinner receives from Dr. Wernick a certificate of honorary membership in E.T.S. (Below right) An informal gathering held prior to the Detroit Branch special meeting included the following: (left to right) C. F. Nixon, A.E.S. first vice president; Wm. J. Neill, A.E.S. president; Dr. William Blum; Dr. S. Wernick; Walter Pinner, Houdaille-Hershey Corporation; W. M. Phillips, General Motors Research Corporation; Frank L. Clifton, president of the Detroit Branch.
(Photos courtesy American Electroplaters' Society)

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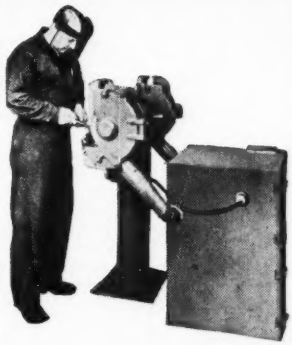
When playing Canasta a careless discard may allow your opponents to pick up the discard pile and thereby meld many points. They will love it but you wont.



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watch discarded abrasive dusts and keep them from damaging parts and machines

At every turn your grinding and polishing wheels are discarding abrasive dusts. Some are a fire hazard. Others can damage machines or finished parts. All are a nuisance that lowers plant efficiency and affects working conditions.

The cards are stacked against you unless you watch these discards. Meld points for your side by equipping dust-creating machines with Torit Dust Collectors. Then there will be no dangerous discards until you are ready to clean up the game.

When playing for dollars you need Torit Dust Collectors for all dust-creating machines. Standard models will fit nearly all installations and special adaptations can be quickly created. For complete information and latest Torit Catalog, write:

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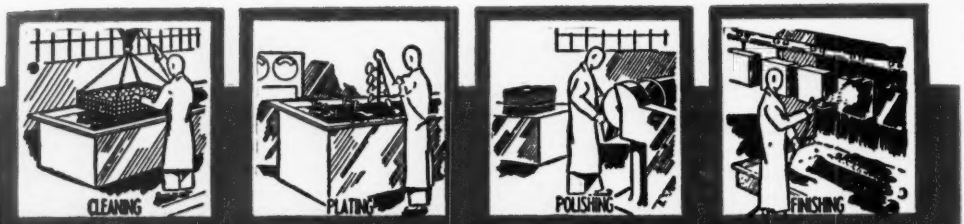

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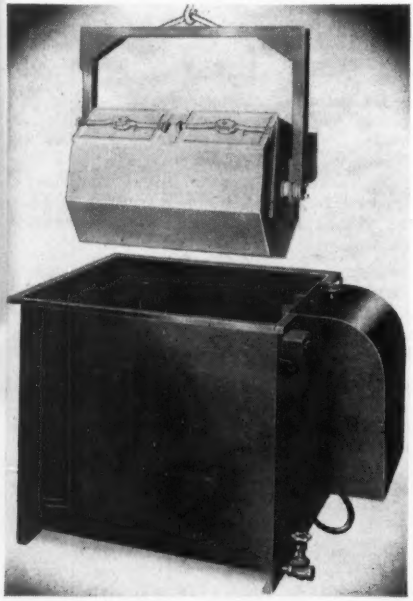
Almco Submerged Finishing Barrel

Particularly useful in the processing of heavy parts and large, soft metal parts is the Model SB-1 Submerged Finishing Barrel, product of Almco, Division of Queen Stove Works, Inc., Albert Lea, Minn. The cushioning effect which results from the complete immersion of the barrel lessens the impact between large parts to such an extent that nicking and scratching are kept to a minimum.



Almco Model SB-1 Submerged Finishing Barrel

Another adaption of the machine is in the processing of smaller parts requiring the utmost in color and micro-inch finish. The perforated steel drum revolves in an open tank of liquid; the drum is loaded with work parts and the abrasive chips or metal shapes. Various liquid compounds are used in the tank, depending on whether the operator is to burnish, polish, clean, descale, or rustproof.

The Model SB-1 is for use alone or "in-line" for multiple operation processing. For example, an in-line installation consisting of six tanks would include a combination cleaning and deburring operation, rinse, descale, and debur at one time, rinse, burnish, hot rinse, or the rustproofing step. In such an arrangement, the drum is loaded with parts and abrasive chips and is moved from one tank to another, eliminating the need for removal of the mass from the drum until the process is completely finished. A special Almco Supersheen separating screen is available for installation at the end of the "line".

Test Services

South Florida Test Service, 4201 N. W. 7th St., Miami 34, Fla., has announced that service and facilities are now available for parallel light transmission and haze determinations on plastic materials following exposure in southern Florida, in accordance with Federal Specification

LP-40-6a Method 3021 and Specification MIL-P-6887, and in conformance with A.S.T.M. D1003-49T and other specifications.

Installation of the Hunter Pivotable-Sphere Hazemeter and Photometric Unit has been completed, as well as additional instrumentation for testing the resistance of plastics, textiles, paints, rubber, and so on, to sunlight (direct, under glass and filters) and weathering, to inland or salt atmospheric, tide water, total immersion, and special tests.

PR Plating

A revolutionary, yet simple, method of metal plating developed by Westinghouse Electric Corporation engineers in 1948 may conserve critical nickel and still provide the nation's new automobiles and appliances with bright, corrosion-resistant trim. Called periodic reverse-current plating (PR plating), the technique can be applied easily to auto bumpers, door handles, radiator grilles, body trim, toasters, irons, and tubular furniture.

Where no nickel at all is permitted, such as on appliances and auto trim, the process provides a chrome-on-copper finish that is as bright as the standard finish and has satisfactory corrosion resistance, it is said. In other cases where some nickel is permitted—auto bumpers, for example—PR plating makes it possible to substitute copper for a major part of the nickel normally used.

Using the Westinghouse system, it is explained, a layer of copper, about one-thousandth of an inch thick, is plated onto the steel base. If nickel is allowed, a layer about one-half the thickness of the copper layer is added. The coating is completed with a film of chrome that may be less than 1/100,000th of an inch thick. Before nickel was put on the critical list, the conventional method was to plate the steel first with nickel and then chrome.

Although not as scarce as nickel, copper is also a critical material, but it is claimed that the plating system requires only very small quantities.

Key feature of the plating system is the periodic reversal of short duration of the plating current. This alternately deposits metal on the surface to be plated, then during the reversal, takes some of it away. Continuation of this cycle builds up a plate quality superior to anything previously obtained from straight, unreversed direct current. In effect, the PR system makes it possible both to improve surface smoothness and brightness, and to enhance the body quality of the deposit.

In the copper plating process the piece to be plated is placed in a bath containing copper in a cyanide solution. When electric current is passed through this bath, copper is deposited on the metal piece—which forms the negative terminal

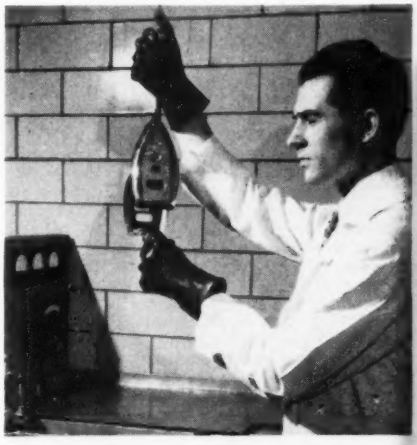


Illustration shows PR-copper-plated article

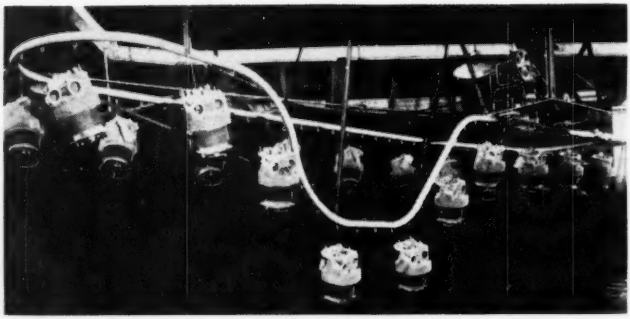
of the system—and dissolved into the bath from a copper electrode which is the positive terminal. Then after less than a minute, the current is reversed. As a result, some of the copper already plated on the metal part is dissolved. This cycle is repeated until a satisfactory finish is achieved. Each time the current is reversed, inferior metal deposits are removed from the surface and succeeding layers are always plated on sound metal to produce a finish that has superior brightness, strength, and freedom from flaws, it is said.

Chain-Veyor

Southern Engineering Co., Inc., 249 N. First St., Burbank, Calif., has available the Chain-Veyor, a light capacity, power-driven, overhead chain conveyor, engineered to provide dependable, trouble-free, long-time operation.

According to the manufacturer, complicated and fast-wearing parts have been eliminated. In addition, the Chain-Veyor is extremely flexible, and its short radius curves and track sections are easily combined so that changes or

Chain-Veyor



additions can be made in a minimum of time.

The unit will handle loads up to 30 pounds on each pendant spaced at 6-inch intervals or, 60-pound loads can be carried at 12-inch intervals when supported by two pendants fitted with a cross bar attachment.

The heavy-duty drive uses a special sprocket-type drive to distribute chain stresses and afford a straight line pull, and permits operation in either direction. Mounting may be made at any 90-degree corner of the conveyor line.

Instant adjustment of conveyor speeds of from 3 to 9 feet per minute while the Chain-Veyor is in operation is made possible by the varispeed drive which is on all standard power units. Higher or lower speed ranges are also available.

The exclusive design of Chain-Veyor's conveyor chain accounts in great part for its long and dependable service, it is claimed. Bronze universal joints have been placed at 3-inch intervals and, to assure equal wheel loading regardless of the direction of the chain pull, load wheels are mounted at a 45-degree angle to the load pendant and at a 90-degree angle to each other. Lifetime lubrication is provided by Oilite bearings. These features permit smooth, frictionless negotiation of curves with radii as short as 15 inches.

Any combination of turns are possible with Chain-Veyor by joining horizontal, vertical top, and vertical bottom curves together.

Park No. 290 BLACKENING SALT

Black Oxide finishing for rust resistance and decorative parts. Speedy black coating in water solution with no electric current. Permanent black finish on ordnance parts, tools, aircraft, bearing races. Dazzling black decorative finish for television cameras, business machines, hardware, metal screens and machine parts. Excellent bond for paints and enamels. Simple one bath operation. Write for bulletin H-16. Park Chemical Co., 8074 Military Ave., Detroit 4, Mich.

Nu-Matic Grinder Head

Nu-Matic Grinders, Inc., 8224 Carnegie Ave., Cleveland 3, Ohio, is marketing a grinder head consisting of a pneumatic rubber drum that can be inflated to low air pressure (3 to 10 pounds). It will grind, polish, and buff irregular and contour surfaces (as well as flat surfaces), and produce a hand finish quickly. The operator can easily vary the air pressure within the rubber drum as well as the r.p.m., and the type and number of grit, to achieve an infinite variety of grinding, buffing, and polishing operations on any kind of surface.

Nu-Matic's rubber drum is 5 inches in diameter and takes any standard band 3½ inches wide. Since the bands can be changed instantly, set-up time and storage are reduced to a minimum.

The grinder head is claimed to provide far greater efficiency since it presents such a large contact area to the surface being worked. Furthermore, it produces a straight pattern on the finished head that closely approximates a hand finish.

Lubseals

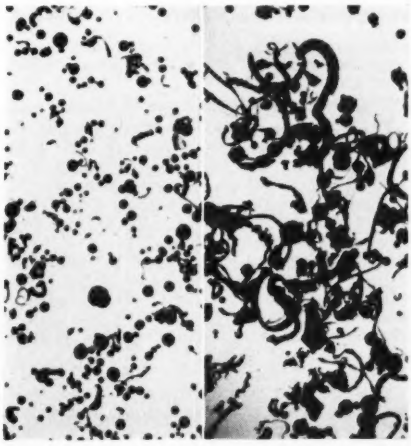
Lubseals, products of Wilson Plastics, Inc., 1531 Milan Rd., Sandusky, Ohio, are small plastic caps which snap over standard grease fittings, sealing out all foreign matter.

Before painting, Lubseals are snapped over grease fittings to prevent paint clogging. After spraying, they may be removed and used over again on successive painting operations.

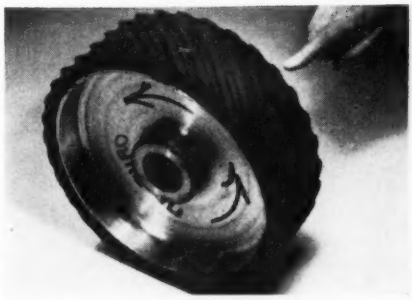
Lubseals are also recommended for use on finished machinery leaving the plant. Bright red in color, they protect and flag every grease fitting, keeping out abrasive dust and metal chips for longer bearing life.

Carborundum "61" Contact Wheel

Designated as the "61," a serrated rubber contact wheel that is said to virtually double belt life in those operations where belt glazing is a problem factor has been announced by The Carborundum Co., Niagara Falls, N. Y. Adaptable to a wide variety of abrasive belt-backstand idler applications, the wheel is made so as to cause a controlled break-



(Left) 50 diameter enlargement of chips removed with polishing belt after 24 minutes' operation with 50 durometer standard serrated contact wheel.
(Right) Chips removed with polishing belt (50 diameter enlargement) after 80 minutes' operation with Carborundum "61" Contact Wheel.



Carborundum "61" Contact Wheel

down in the bond of the abrasive belt with the result that glazing is reduced to such a high degree that life is said to be doubled.

In addition to increase in belt life and cutting rates resulting from the relief angle, wide-spaced lands, and narrowness of lands of the wheel, the latter is also claimed to reduce the number of belt changes and provide for a more uniform finish since the rate of cut over the life of the belt is said to be more constant and loading considerably diminished. Moreover, since the wheel assumes a heavy part of the work load, operator fatigue is effectively reduced.

MD 769 Aluminum Paste

A special extra fine aluminum lining pigment, capable of producing films of chrome-like appearance, has been announced by Metals Disintegrating Co., Elizabeth, N. J., manufacturer of metal pigments, metal powders, and metal abrasives.

Maximum brilliance and metallic luster are obtained with MD 769 Aluminum Paste, which is particularly recommended for simulated chrome finishes. Its appearance is said to be as near to chrome as is possible to obtain with a metal pigment. Its use is particularly recommended for automotive hardware.

The paste, it is stated, provides a high degree of improved dispersibility. When combined with the proper vehicle, mixtures made with it are practically free from agglomerated particles. With its use the utmost in smoothness and leveling are obtained.

MD 769 Aluminum Paste is a leafing-type pigment, containing 65 per cent nonvolatile content. It is a very fine type of pigment, screen test showing 100 per cent through 325 mesh.

Paint Deflocculator

Kelite "Skimeze" is a concentrated semi-paste deflocculator especially compounded for zinc chromate, P-27 Primer, alkyd resin primers, varnish, and chassis black primer by Kelite Products, Inc., P. O. Box 2917, Terminal Annex, Los Angeles 54, Calif. It is not suitable for enamels.

Kelite Skimeze is added to the spray booth solution, and since it is nearly neutral in pH, the paint can be reclaimed. Skimeze is highly concentrated, and only about ¼ ounce is needed per gallon of water. The solution is very easily maintained at the proper strength merely by watching the degree of deflocculation of the paint.

Remote Control Arm for Backstand Installation

Behr-Manning Corp., Troy, N. Y., has developed a remote control arm for use on backstand installations in conjunction with the Delta idler unit. The advantages which are said to be provided by the use of this remote control arm are: (1) the operator has, at all times, complete control of belt tracking, particularly in cases where belts and wheels 1½ inches and narrower are used; (2) the elimination of down time in cases where belt guards have to be removed for belt tracking alignment; and (3) any belt alignment desired can be quickly and easily obtained by the operator from the front operating position of the polishing lathe.

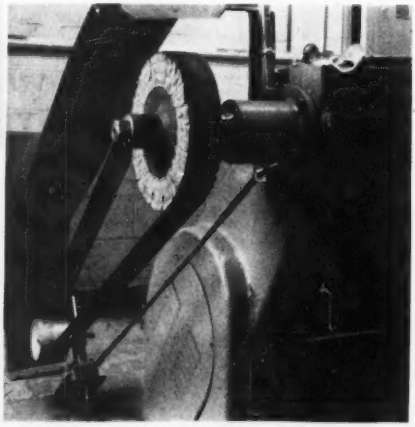
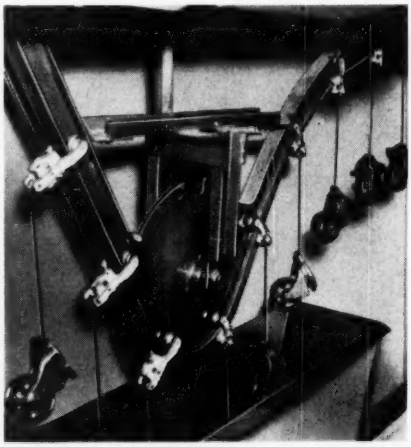


Illustration showing backstand installation of Behr-Manning Remote Control Arm

Buschman "Quick Vertical Dip"

A sharp vertical overhead conveyor curve known as the "Quick Dip" has been announced by the E. W. Buschman Co., Dept. 31-B, Cincinnati 32, Ohio. Developed for, and largely used in dip painting of conveyor-carried production, it is the sharpest vertical curve made for overhead trolley wheel type conveyor.



Buschman "Quick Vertical Dip" in operation

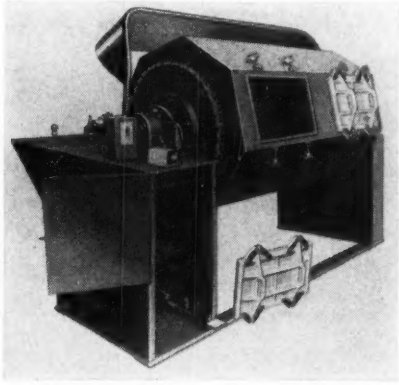
Used with the Buschman Universal Cable Trolley Conveyor, the Quick Dip offers several advantages. With a 10 x 18-inch part as an example, a standard 45-degree curve dip requires a paint tank 8 feet long; a close-coupled 45-degree dip takes a 6-foot long tank. With the Quick Dip, the tank is only 4½ feet long, saving both paint and space.

Buschman Universal Cable Trolley Conveyor, for which the unit has been designed, is a compact, lightweight cable trolley conveyor designed for light and medium loads. Trolleys are located on 12-inch centers, and the load may be carried on either 12, 24, or 36-inch centers.

Like the rest of the conveyor, the Quick Dip is factory fabricated for field assembly without welding, if desired. The radius of the curve is 9½ inches; the included angle, 60 degrees.

"Murco" Tumbling Barrel

Manufactured in both constant and variable speeds by the D. J. Murray Manufacturing Co., Wausau, Wis., the



"Murco" Tumbling Barrel

"Murco" Tumbling Barrel has both motor and operating mechanism totally enclosed. The only exposed parts are the controls and magnetic reversing starter. A limit switch permits operation only when the hood is closed.

Illustrated is the 7½ h.p. constant speed model that operates at 25 r.p.m. The variable speed 7½ h.p. model has speeds from 8 r.p.m. slow speed to 25 r.p.m. high speed, with an infinite range of speeds in between to meet operating conditions.

Speed changes may be made while the barrel is in motion; there are no cumbersome changes of belts and pulleys. The foot-operated hydraulic brake at floor level stops the barrel in any position, facilitates loading and unloading, and prevents accidental dumping of loads.

The Murco Tumbling Barrel is also made in 5 and 3 h. p. constant and variable speed models.

Black Oxide Process

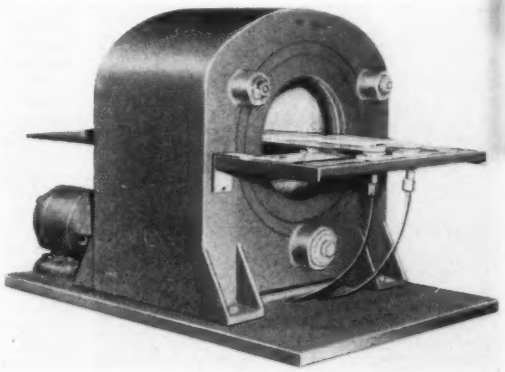
The Mitchell-Bradford Chemical Co., 2446-D Main St., Stratford, Conn., has marketed its Black Magic Type A, a black oxide process for iron and steel.

Black Magic Type A is a one bath, one salt process and operates at a temperature of 290 deg. F. It requires only 6½ pounds of Black Magic salts per gallon of blackening solution. According to the manufacturer, Black Magic Type A produces an excellent corrosion-resistant finish by reason of the fact that the black iron oxide (Fe_3O_4) formed by the blackening solution absorbs a larger amount of the oil, wax, or other material used as the final dip in the process.

Black Magic Type A is said to reduce the blackening time cycle. The material will also blacken heat treated or hardened parts without difficulty. Since Black Magic Type A is self-rectifying, particularly with regard to colloidal red iron oxides and other contaminants, steel parts with brazed areas can be processed through the solution without difficulty. Because of the relatively low operating temperature and the low concentration of Black Magic salt, the solution is highly fluid, and this results in a minimum of loss from dragout of solution on the work, it is claimed.

Norris Gyromat

Manufactured by the Gyromat Corp., P. O. Box 600, Fairfield, Conn., the Norris Gyromat applies a full coverage coating of from 0.0008 to 0.025 inch thickness of any coating material in one passage, at high speed. This is accomplished by means of high speed rotors which atomize and direct the paint to the work



Norris Gyromat

being passed through the rotating bowl.

The overspray is caught by Gyromat's rotating inner bowl and returned to the annulus in its former fluid state and reused, a vapor pressure equilibrium being automatically maintained.

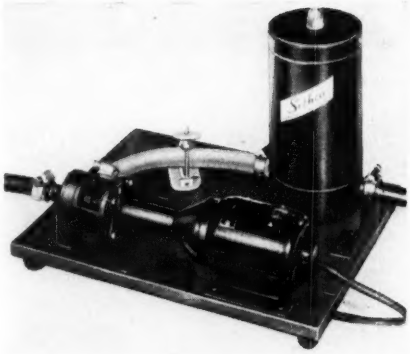
According to the manufacturer, Gyromat's versatile services include improved coatings for ceramics, delicate electrical relays, electronic parts, bulky metal products, and so on.

Sethco Filter Pump Model HHUE-5

Sethco announces a filter pump unit known as Model HHUE-5. This power-operated filter is equipped with an asbestos-impregnated furfuryl alcohol resin filter cylinder and a Hastalloy pump and fittings, and is rated for filtering at 50 gallons per hour.

The advantages, cited by Sethco, 105-07 150th St., Jamaica 4, N. Y., in filtering with Model HHUE-5 are as follows:

1. Complete resistance to all electroplating and industral solutions. The combination of the asbestos impregnated furfuryl alcohol resin filter cylinders and the Hastalloy pump results in a filter pump unit which can handle all acids and alkalies and an impressive list of solvents including the chlorinated aromatic compounds.
2. Higher temperature solutions can be handled. Solutions up to 265 deg. F. can be filtered continuously or intermittently. This permits operation with corrosive chemicals at their boiling points or even higher.
3. No loss of expensive solution. Filter holds about one pint of solution, all of which is completely recoverable.
4. Filter tube can be backwashed or washed. Filter element is a specially processed cotton yarn wound around a stainless steel supporting core. Porous stone and porous carbon filter tubes are furnished for concentrated alkali solutions respectively. Filter tubes may be used over and over again.
5. Crystal clear filtration. Filter tubes will remove even the finest particles.
6. Simple operation. It takes less than one minute to begin any filtration job.



Sethco Filter Pump Model HHUE-5

Corrosion-Resistant Finishes for Zinc

United Chromium, Inc., 100 E. 42nd St., New York 17, N. Y., has added two compounds to its line of Unichrome Dip Compounds for decorative and protective finishing of zinc. The additions are identified as Unichrome Dip Compounds 1060 and 1070 and are used to produce corrosion-resisting, chromate-type conversion coatings that are black or olive drab in color.

These compounds yield lustrous finishes that meet the corrosion-resistance requirements of most specifications for chromatic-type conversion coatings on zinc. The finishes are produced on a metal-conserving deposit of 0.0002 to 0.0005 inch of zinc. The process is a simple dip which can be carried out at room temperature.

In addition to these compounds, other Unichrome Dip Compounds are available for producing clear finishes on zinc plate and also yellow iridescent coatings on zinc plate or zinc die castings. The compounds used for producing the clear finish with an appearance similar to chromium

are Unichrome Dip Compounds 95 and 98. The important difference between these compounds is their speed of reaction on zinc, the slower reacting Compound 98 being ideal for finishing with full automatic equipment. Dip Compound 95, which is used at a dilution of 1:7 for producing the clear finish, can be further diluted from 1:20 to 1:80 to produce a yellow iridescent finish. This finish can be employed to increase the corrosion resistance of zinc or to prepare zinc for painting.

Fast Drying Enamel for Ammunition Components

An enamel which dries twice as fast as that previously used for ammunition finishes has been developed by the Paint & Chemical Laboratory at Aberdeen Proving Ground, Maryland. Based on the use of the quick-drying, styrenated-alkyd resins, it is anticipated that this improved rate of dry will speed up production lines on Army ordnance shells, bombs, grenades, and other ammunition components.

The new specification, MIL-E-10687 (ORD), indicates that the enamel will set to touch in a maximum of 6 minutes and dry hard in 10 minutes. It is reported that this acceleration in drying speed is accompanied by increased toughness, adhesion, and resistance to salt spray and weathering; for example, while salt spray resistance of at least 150 hours is required, test panels exposed for over 250 hours in the Aberdeen laboratories have shown negligible failure.

Specifications for purchases from qualified bidders describe the finish as a synthetic, quick-drying, lusterless enamel, which will cover white and seven identifying colors.

The research which led to the development of the improved finish for ammunition utilized the advantages of CYCOPOL Resins, the styrenated alkyds developed by the American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y. Developed two years ago, they are being used in both industrial and household finishes, resulting in the production of enamels which approach lacquer in drying speed.

Protective Creams and Liquids

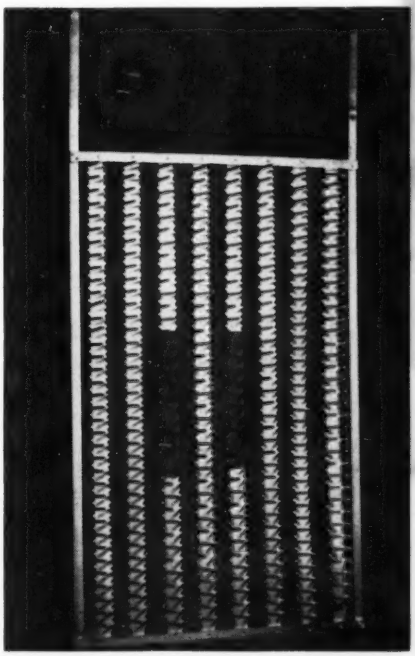
A complete line of barrier creams and liquids for skin protection and cleaning has been marketed by the Safety Division of the Boyer-Campbell Co., 6540 St. Antoine St., Detroit 2, Mich., and is known as "Skin-Cote." It consists of six types of creams and four liquids to take care of every individual need.

The creams are packed in 8, 12, and 16-ounce jars, 12 or 24 jars to a carton, and 25-pound pails; the liquids in pints, gallons, and 50-gallon drums. In several of the larger automobile plants it has been found that using only two types of "Skin-Cote" provides almost complete protection and has made dermatitis one of the minor hazards.

All-Brite Aluminum Rack

All-Brite Chemical Co., Main St., Oakville, Conn., is offering an aluminum rack for use in anodizing aluminum parts.

Made of 0.050-inch tempered aluminum, the rack is stamped out in one piece. There are no rivets, wires, or loose connections. The rack will handle 74 pieces by itself. By mounting eight strips on a frame, it can accommodate up to approximately 600 parts.



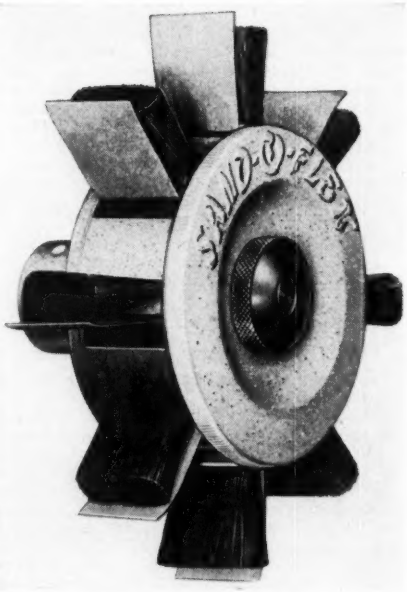
All-Brite Aluminum Rack

Portable Sand-O-Flex

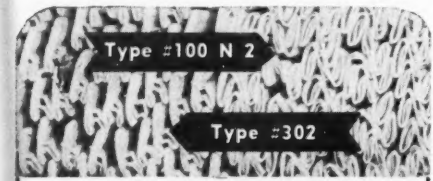
An improved Sand-O-Flex sanding wheel, known as Model 350R, is now in production at Merit Products, Inc., 4023 Irving Pl., Culver City, Calif. The unit is a brush-backed sanding device that may be attached to any rotating shaft for sanding and finishing curved and contoured surfaces. This model is particularly recommended for use on portable electric drills and flexible shafts because of its light weight and compactness.

The cover has been concaved to allow the knurled nut, which holds the cover in place, to be inset flush with the face of the tool, thus materially reducing the bulk and increasing the sander's efficiency and maneuverability when being used portably. Weight has been decreased by four ounces for easier handling. Loading of the refill cartridge has been simplified. Overall diameter is 5½ inches.

The sander has eight replaceable brushes fastened to its perimeter. These brushes back up and "cushion" eight strands of abrasive cloth, 1 inch wide, which unwind from a single core. As the wheel rotates, the abrasive strips mold to the contour of the workpiece, with a "paint brush" action, and finish metals, compositions, and any material requiring an abrasive operation. When wheel rotates at normal speed, the wheel delivers 14,000 sanding strokes per minute. As abrasive wears, it is cut or torn off and new abrasive is fed out from the central magazine. By changing grit, all types of finishes can be obtained—from coarse to very fine satin finishes.



Sand-O-Flex Model 350R



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Cro-Hone, Jr.

Fast, uniform, high luster finishes on all types of metal parts and tools are possible by the use of a bench model wet-blaster called the Cro-Hone, Jr., manufactured by the Cro-Plate Company, Inc., 747 Windsor St., Hartford, Connecticut.

Designed to offer a surgically clean base for plating or painting and remove completely all foreign and amorphous substance from metal surfaces, the Cro-Hone, Jr. uses a fine abrasive suspended in a water carrier which is forced against large or small metal parts by air pressure through a siphon jet gun.

Of full stainless steel construction, the unit has no moving parts or circulating pumps. Also, the small, compact con-

Cro-Hone, Jr. in use

struction of the unit, coupled with low abrasive replacement, ideally suits it for use in tool and die shops, electroplating shops, methods engineering setups, auto repair shops, and college and university labs.

In operation, the metal parts to be finished are inserted through the front window door. All openings are fitted with splash-proof guards which allow neat, leakage-free installation. All controls are located within easy reach on the side of the cabinet and the large, clear-view window enables the operator to watch progress of the work. A blower clears away the abrasive splash so that vision is not obscured. The work is held in one hand, the easily-manipulated gun in the other.

A removable filter facilitates cleaning and changing of the unit. All that is needed for immediate operation is a $\frac{3}{8}$-inch air connection and a $\frac{1}{2}$-inch water connection.

Nickel Brightener Process

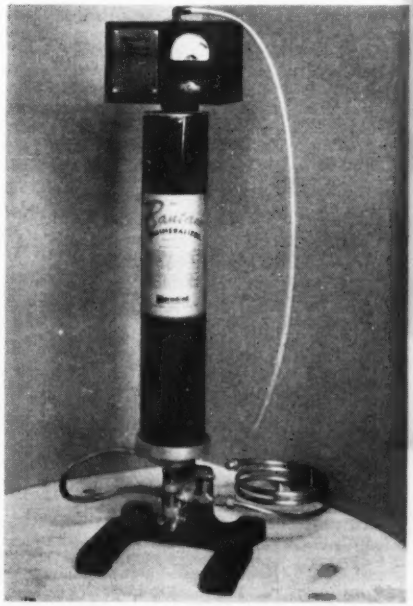
The Gill Corp., 5317 St. Clair Ave., Cleveland, Ohio, has developed the Smoothex Nickel Brightener Process, a fast, lustrous nickel plating method which possesses excellent line-filling properties. Marks of poor workmanship, flaws in material, or lines left by the polishing wheel can be refilled with the Smoothex Bright Nickel Bath. It can be operated at current densities from 5 to 100 amp./sq. ft. Fine grain structure of the electrodeposit is assured and luster is good, it is claimed.

The Smoothex Nickel Brightener Process assures ease of control, superior brightness and color, and adaptability. Other processes can be converted easily, it is claimed, conversion consisting of carbon filtrations, high pH treatment, and addition of Smoothex materials to the treated bath.

The Process can be used on buffed brass, steel, and copper; unpolished cold-rolled steel, fine finished steel, dull steel; and die castings after conventional copper cyanide plating.

Improved Bantam Demineralizer

Barnstead Still & Sterilizer Co., 2 Lanesville Terrace, Forest Hills, Boston 31, Mass., announces that its Bantam Demineralizer is now equipped with a direct reading meter which indicates the purity of the water at any time and maintains a constant purity check on the



Bantam Demineralizer equipped with direct reading meter

flow of demineralized water. For convenience, the instrument is calibrated in parts per million and also in ohms electrical resistance.

The Bantam Demineralizer is also complete with a needle-type regulating valve for easy flow adjustment, a drain valve, and a sturdy base for bench mounting. The base is removable if wall mounting is desired.

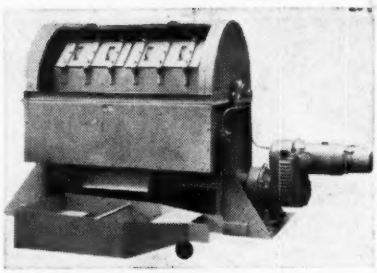
Enclosed Deburring Barrel

Convenience, efficiency, and safety are provided by the enclosed deburring barrel announced by the Belke Manufacturing Co., 947 N. Cicero Ave., Chicago 47, Ill. Turning a hand crank adjusts the enclosed drive to any speed from 10 to 40 r.p.m. Other speeds are available.

The aluminum doors are lightweight and easily locked for water-tight closure. Wire mesh doors are furnished for use when draining or rinsing the work. A steel chute below the barrel guides drainage, media, or work into a tricycle dump pan.

Wheels of the tricycle dump pan are ball bearing equipped. The front of the pan has a funnel shaped snout for pouring without spilling. A bar across the center of the pan provides a convenient handle for lifting with a hoist or by hand. When not in use, the dump pan rolls into a space provided underneath the barrel.

The model illustrated has two compartments lined with hard maple; each compartment is 22 inches wide x 29 inches across the flat surfaces. The barrel is also available with one, two, three, or four compartments.



Enclosed, Double-Compartment Deburring Barrel

The top of the case slides down to form complete enclosure when the barrel is in operation. A magnetic brake and a reversing switch are optional features.

Bright Decorative Metal Finish

Many consumer items may now be fabricated with a bright decorative metal finish but without the use of critical materials as a result of a process developed by the Kenmore Metals Corp., 380 Ninth St., Jersey City 2, New Jersey.

The process is a new method of electroplating silver on steel wire and rod. Improved continuous plating methods and precise process control permit the use of unusually small amounts of silver for a durable, decorative finish, the company states.

Expansion-Type Bellows

The manufacture of expansion-type bellows for the absorption of high frequency vibration and lineal expansion in many types of equipment has been announced by Titeflex, Inc., 531 Frelinghuysen Avenue, Newark 5, N. J. Constructed of convoluted metal diaphragms welded into complete units, the bellows have been tested in many operations and have been found especially valuable for

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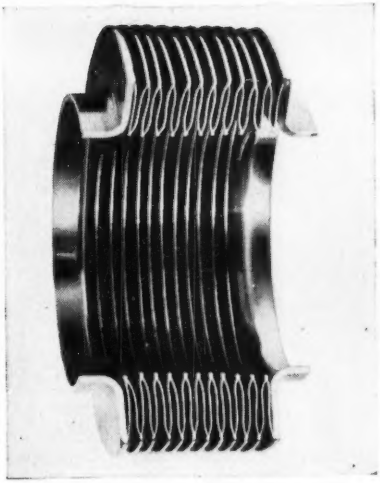


Titeflex Expension-Type Bellows

applications involving constant high pressures, corrosive liquids and gases, and extreme temperatures in sealed piping systems.

Available in sizes from 1 to 5-inch I.D. in various lengths, the bellows are manufactured in plain and stainless steels, brass, bronze, Monel, and Inconel according to individual heat, pressure, and corrosion requirements. Height of the convolutions themselves varies according to the degree of flexibility required within a specified length, and wall thicknesses may be increased dependent on pressure requirements. Titeflex bellows may be supplied with or without sleeve liners.

All-Welded Parts Cleaning Basket

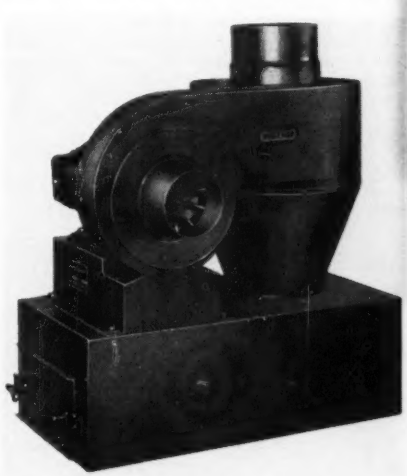
All-welded construction of spin-dry baskets, in which eight or more parallel formed steel stays are welded to the top ring as well as to double-reinforced bottom rings, is claimed to provide outstanding durability, according to the manufacturer, Hoffman Co., York, Pennsylvania.

Screen material, whether woven wire, expanded metal, or perforated metal, is welded at every point of contact with the frame, making the basket one solid unit. The design is adaptable to baskets for almost any size parts and is made with special welded reinforcing to take bottom impact or tumbling action.

Filterless Dust Collector Exhausts Cleaned Air to Out-of-Doors

The "Dustkop" Model 4N20 Dust Collector illustrated herewith, product of Aget-Detroit Co., 207 Main St., Ann Arbor, Mich., is especially intended for use where remotely located dust sources have toxic fumes, vapors, or obnoxious odors. The unit, which requires a floor space of 12 x 23 inches, is designed to develop a rated 437 c.f.m. and 5,000 f.p.m. velocity at the inlet. This amount of suction is said to be adequate to handle a buffing, polishing, or grinding wheel up to 10 inches in diameter or two wheels for similar work from 3 to 7 inches in diameter.

Also recommended for use in connection with sanding operations performed with a belt or disc sander on rubber or synthetic materials, the Model 4N20 is entirely self-contained, motive power being provided by a ⅓ h.p. 3,600 r.p.m. continuous duty motor direct driving a self-clearing paddle-wheel type fan. The dust and fume-laden air is directed into a cyclone separator where all material is removed from the air stream except the toxic odors, fumes, and extremely fine dusts which are exhausted to the out-of-



"Dustkop" Model 4N20 Dust Collector

doors through an outlet at the top of the cyclone. The collector may be obtained optionally with a single 4 inch, single 3-inch, or double 3-inch inlet. The motor is designed for operation on 110-volt single-phase 60-cycle power but may also be obtained for operation on 220 or 440-volt three-phase 60-cycle a.c. power.

Rust Proofing Process

Recommended as a replacement for cadmium or zinc in many rust-proofing applications is Perm-Cote, a phosphate coating material developed by Detrex Corp., Box 501, Detroit 32, Michigan.

When immersed in a solution of the material, iron and steel surfaces are chemically converted into a dark gray, uniform, dense, non-metallic phosphate coating. After rinsing, the highly absorbent coating is impregnated with a rust-proofing oil known as Perm-Oil, giving the products a permanent corrosion-proof layer that is dry to the touch.

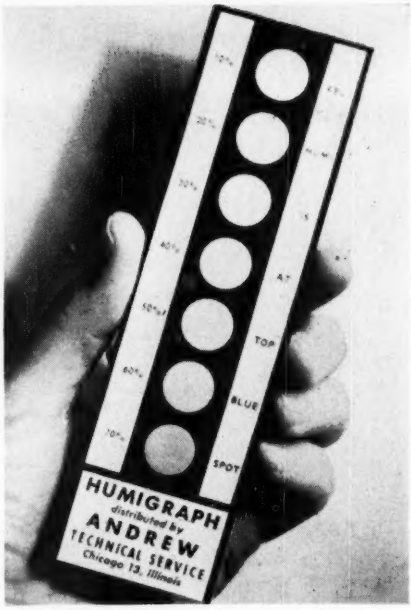
Standard salt spray tests indicate a resistance well in excess of the 36 hours required in U. S. Army Specification 57-0-2c, Type II, Class B.

Typical applications for Perm-Cote are metal fasteners, springs, hardware and hand tools, appliances, sheet metal parts, rockets, clips and links, and mortar shells.

Humidity Indicator

A humidity indicator called "Humigraph", which consists of a card measuring 6¾ x 1⅞ inches with a vertical column of seven color spots denoting relative humidity from 10 to 70 per cent, has been marketed by Andrew Technical Service, 3905 N. Clark St., Chicago 13, Illinois.

Usable at temperatures from 50 to 200 degrees F., the Humigraph is claimed to be accurate at low and normal humidities for many months. For small changes in humidity, the card responds in about ten minutes, and for a change of 40 per cent, the response time is about 30 minutes. Changes in humidity cause the spots to turn color. The reading is made at the top blue spot.



"Humigraph" Humidity Indicator

The indicator is recommended for use as an insert for long-term packaging of materials affected by humidity changes, or for spot checking of humidity without recourse to instruments or charts.

Protective Rubber Coatings

Natural or synthetic protective coatings for metal parts and products to provide protection against corrosion or abrasion is a service offered by the American Rubberizing Co., 617 11th Ave., S., Minneapolis 4, Minn. Equipment so bonded lasts longer, increases equipment life, and prevents unscheduled interruptions to production by reason of equipment failure, it is claimed.

Coatings, either dipped or sprayed, may be applied to any type equipment, inside or out, regardless of size, shape, use, or

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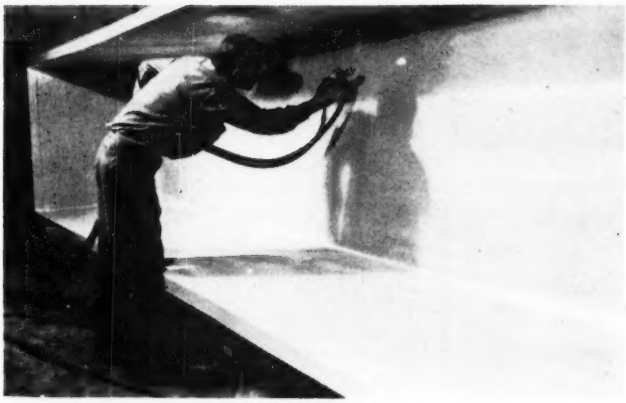


Plating tank being sprayed with Neoprene for acid and corrosion resistance

quantity, the company states. Various applications include tank and chute lining, parts dipping, plating racks, and screens.

The illustration shows a 20 x 4 x 4-foot steel tank to be used for plating being made acid and corrosion resistant by a spray application of Neoprene laid on to a thickness of $\frac{5}{16}$ to $\frac{3}{8}$ inch.

American Rubberizing also processes canvas and cotton knit gloves with natural rubber, Neoprene, or plastic.

Klaas Conveyor

The Klaas Machine & Manufacturing Co., 4327 E. 49th St., Cleveland 25, Ohio, has designed a conveyor for coating and drying sheet metal, which can be adapted also to handle flat parts.

Metal sheets are pulled by power on a large steel roller of the unit. At the start of the conveyor the coating is applied to both sides of the sheet simultaneously. As the coated material moves down the conveyor, a series of infra-red lamps dries the coating by the time the metal reaches the end. The entire cycle is automatic.

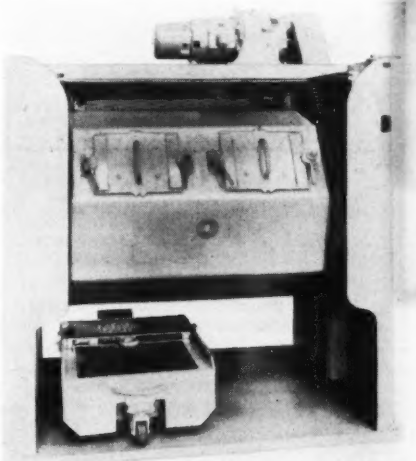
Framework of the conveyor is of structural steel, bolted and welded. Dimensions are: 20 feet long x 4 feet wide x 3 feet high.

Improved Tumble Finishing Machines

Tumble finishing machines manufactured by the Crown Rheostat & Supply Co., 3465 N. Kimball Ave., Chicago 18, Ill., have been redesigned and improved. Used to deburr and smooth corners, the units feature Crown "Buffer Strip Lining" which makes possible on-the-spot replacement, keeping to a minimum the down time needed for lining renewal. Semi-soft rubber linings are also available.

A variable speed drive provides a wide choice of speeds for the processing of steel, die cast, or other metal parts. An automatic timer assures a definite operating time, thus avoiding the over or under-running of work during the processing period.

Added features cited by the manufacturer include lightweight doors with "full grip" door lock handles. A newly designed full gasket door plate has been



Crown Improved Tumble Finishing Machines

incorporated to provide a water-tight door seal and facilitate replacement of the door gasket.

PRODUCT LITERATURE

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.

Dura-Cut Abrasive Discs. Bay State Abrasive Products Co., Westboro, Mass., has available a reprint describing its multiple layer abrasive discs and illustrating a few typical applications.

ElectroniK Potentiometers. A 36-page catalog covering ElectroniK electric control potentiometers for both contact and proportional control is available from the Minneapolis-Honeywell Regulator Co., Industrial Div., Station 40, Wayne and Windrim Aves., Philadelphia 44, Pa. Engineering and constructional data, types of control, partial list of available ranges, application data, and accessories are described in **Catalog 15-15.**

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HEIL Process Equip. Corp.
12901 Elmwood Ave., Clv'd 11, O.

Chromium Plating Anodes. United Chromium, Incorporated, 100 E. 42nd St., New York 17, N. Y., has available a leaflet listing specifications of its entire line of chromium plating anodes.

Metal Powders, Pigments, and Abrasives. A 16-page illustrated book describing the company and it affiliates has been issued by Metals Disintegrating Co., Inc., Elizabeth, N. J., manufacturer of metal powders, metal pigments, and metal abrasives. Shown are pictures of the various laboratories maintained by the company, and also parts and other objects which represent the end use of the powders and pigments.

Chemical Resistant Plastic Pipe and Fittings. Complete engineering data on tubing, pipe, valves, and fittings of Ace-Saran and Ace-Parian (polyethylene) plastics are given in a 16-page bulletin released by American Hard Rubber Co., 11 Mercer St., New York 13, N. Y. Of particular interest are tables of properties and tables of resistance to a long list of common chemicals. The bulletin also gives bursting and working pressures, standard sizes and weights, and so on, and offers helpful information on the fabrication of complete systems from these new plastics.

Steam-Detergent Cleaning. An interesting discussion of how steam-detergent cleaning saves time and work and helps cut costs in connection with industrial maintenance operations is provided in an illustrated folder available from Oakite Products, Inc., 120 Thames St., New York 6, N. Y. In addition to listing specific tasks in industry for which steam-detergent cleaning has demonstrated exceptional effectiveness, the folder also supplies detailed specifications of the types of steam-cleaning equipment available, and offers helpful data on the preparation of efficient working solutions for use with this equipment.

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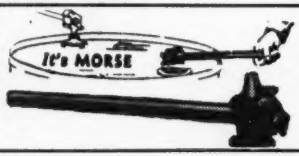

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Aluminum Viscosity Cup. Henry A. Gardner Laboratory, Inc., 4723 Elm St., Bethesda 14, Md., has available a six-page folder descriptive of its No. 4 Ford Type Aluminum Viscosity Cup for determining the viscosity of paints, varnishes, lacquers, oils, and so on.

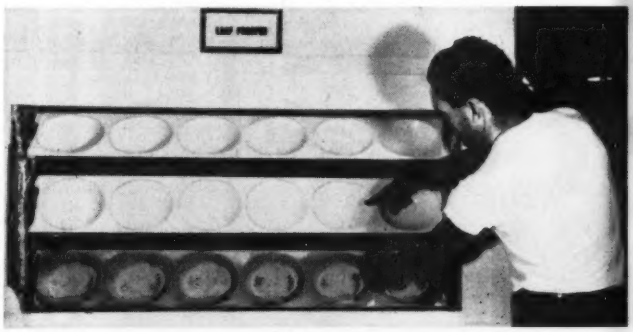
Permanently Marked Stainless Steel. A folder has been prepared by Ateenate, Inc., 111 Sagamore St., North Quincy 71, Mass., which illustrates and describes the Ateenate process for permanently reproducing any design, character, diagram, message, or photograph on stainless steel.

Emulsoprep Emulsion and Alkaline Metal Cleaners, products of the Neilson Chemical Co., 6561 Benson St., Detroit 7, Mich., and available for all types of metals and applications, dip or spray, are described in **Emulsoprep Bulletin 50-61.**

Crown Improved Tumble Finishing Machines. A complete catalog covering machines and auxiliary equipment is available from the Crown Rheostat & Supply Co., 3465 N. Kimball Ave., Chicago 18, Illinois.

Swartwout Airfuge. Information on the complete Swartwout Airfuge line of separators for cleaning compressed air by means of centrifugal force may be obtained by requesting **Bulletin S-13** from The Swartwout Co., 18511 Euclid Ave., Cleveland 12, Ohio.

Cellolyn 501, an age-stable alkyd resin for maximum durability in nitrocellulose lacquer, is the topic of a booklet available from the Hercules Powder Co., Synthetics Dept., 927 Market St., Wilmington, Del. Advantages, properties, and uses are set forth in this eight-page brochure.



Commercial bread bakers can now prevent hard-to-remove molds and crusts from forming in their dough-proofing trays with a new Vinylite resin-based coating. Resistant to both acids and alkalies, the coating provides a nonporous surface for the trays with sections for loaf-size dough portions. These trays hold the dough for a 10 to 15-minute intermediate rising period before baking during which the flour gluten forms a sticky mass. Trays coated with the new material need only be wiped out with a cloth to restore their gleaming, glossy surface when the dough is removed (top two trays in photo). Uncoated trays (bottom tray) respond very little to hard cleaning and quickly accumulate thick mold and crust to such extent that chipping or sandblasting is required to remove the scale.

Bakers are also experimenting with the Vinylite resin-based material for coating troughs in which bread dough undergoes its first rising period. The coating may be applied by brush or spray and is available in a wide range of standard colors or may be pigmented to meet special requirements.

Based on Vinylite resins, this protective coating for bread bakers' proofing trays is made by Nukem Products Corporation, 111-119 Colgate Ave., Buffalo 20, N. Y.

(Photo courtesy Bakelite Div., Union Carbide and Carbon Corp., New York 17, N. Y.)

Murco Tumbling Barrels. D. J. Murray Manufacturing Co., Wausau, Wis., has issued a catalog descriptive of its six latest models of tumbling barrels, both constant and variable speeds, with complete specifications of each unit.

Hazen Knock-Down Materials Handling Box. Jervis B. Webb Co., 8933 Alpine Ave., Detroit 4, Mich., has available a brochure giving complete information on this materials handling system.

Metal Cleaners. Four Cowles metal cleaners are discussed in a booklet, **"Heavy Duty Cleaning—The Fast Way,"** released by the Cowles Chemical Co., 7016 Euclid Ave., Cleveland 3, Ohio. The booklet was especially designed to explain how and why operating time can be cut when Cowles HD-N Cleaner is used in heavy metal cleaning. It points out types of soil removed and the physical and chemical methods used in their removal. HD-N is discussed fully, along with Cowles LP Cleaner for removing buffing and drawing compounds, Cowles SK Cleaner for oil, fat, and grease removal, and Cowles LIXOL Cleaner for use in pressure-spray washers.

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"Skin-Cote Fortifies the Future of Working Hands" is the title of a 16-page catalog describing a complete line of barrier creams and liquids for skin protection and cleaning, which can be obtained from The Boyer-Campbell Co., 6540 St. Antoine St., Detroit 2, Michigan.

Ucilon Coating Systems. U. C. I. Bulletin U-6a, issued by United Chromium Inc., 100 E. 42nd St., New York 17, N. Y., describes Ucilon Coating Systems for resistance to the corrosion of a wide variety of chemical products. Recommendations for different conditions of contact are made.

Dremel Model 2000 Electric Sander-Polisher, for sanding, rubbing down, or polishing, even in tight corners or other awkward spots, is described and illustrated in a leaflet distributed by the Dremel Manufacturing Co., Racine, Wisconsin.

Radiant Heaters. Edwin L. Wiegand Co., 7552 Thomas Blvd., Pittsburgh 8, Pa., has prepared **Folder F-1523** which discusses and illustrates eight advantages of its Chromalox Electric Radiant Heater. In addition, many photo stories depict the diversified applications of the unit.

Tramrail. An illustrated four-page bulletin describing the Ohio Tramrail line of cranes, transfer bridges, and tramrail systems has been issued by The Forker Corp., 2044 Random Rd., Cleveland 6, Ohio. Shown are numerous installation photographs and parts details, together with a complete story on the Ohio Tramrail Shielded Electrification System. Available with the bulletin are specification-detail sheets which enable the methods or layout engineer to figure his plant's rolling live loads, weights, and spans so that he can compute and specify his own tramrail or crane installation.

Surface Preparation of Metals for Black Oxide Finishing. Helpful data on materials and procedures that produce the chemically clean surfaces required for black oxide finishing of metals are presented in a special Service Report available from Oakite Products Inc., 120 Thames St., New York 6, N. Y. After first stressing the importance of proper preparation of metal surfaces to assure consistent, uniform, non-mottled coatings, the Service Report views in detail recommended materials and methods for performing the following preparatory operations before black finishing: alkaline cleaning of ferrous metals to remove light soils; solvent cleaning where heavier soils must be removed; electrocleaning ferrous metals to remove carbon smuts and other coatings; rust and scale removal; controlling acid solutions when pickling iron and steel; tank cleaning of non-ferrous metals; and electrocleaning non-ferrous metals. Formulas for using the materials recommended for these operations are specified in each instance.

A special section of the report describes how a hot-oil bath treatment for black-oxide coated parts not scheduled for organic finishing enhances the black finish and provides effective anti-rust protection. In conclusion, the report reviews materials and methods for stripping black finishes from iron and steel and non-ferrous rejects.

Porter-Cable Backstand Idlers are the subject of a bulletin which has been published by the Porter-Cable Machine Co., 1708 N. Salina St., Syracuse 8, N. Y. Both floor and wall models are illustrated and described.

Water and Liquid Level Gages. A 24-page bulletin on Water Level Gages has been published by The Bristol Co., Waterbury 20, Conn. **Bulletin No. L700** describes instruments for measuring and recording water depth in reservoirs, elevated tanks, irrigation systems, process storage tanks, flumes, and weirs. Float, Pressure Bulb, Pressure, Counterpoise, Differential Pressure, and Air-Bubbler types of liquid level gages for a variety of uses are described, including the measurement and automatic control of water and other liquids and solutions, whether flowing, turbulent, corrosive, under static pressure, covered with ice, or carrying solid matter. Applications of the instruments to chemical processing operations involving solutions, suspensions, and organic liquids are included.

The bulletin also contains information on remote recording and remote automatic pump control of water level with Metameter telemetering instruments. A large number of photographs and drawings of typical applications supplements the technical information.

SHIPPING CONTAINERS FOR AIR FREIGHT GET ACID TEST. —This pliable bottle of polyethylene can take a terrific beating and literally bounce back undamaged. Its skin-burning sulfuric acid contents will stay securely confined within the bottle throughout the roughest flight. Air Material Command's Packaging Branch now specifies polyethylene containers when acids are transported by air. *(Photo courtesy USAF Air Material Command, Wright-Patterson Air Force Base, Dayton, Ohio)*

For more complete information on products and processes use READER SERVICE CARDS inside covers.

Finishing Equipment and Supplies. A data sheet listing many items useful to electroplaters and supplied by Technic Inc., 39 Snow St., Providence, R. I., is being distributed by the company. Discussed on the data sheet are a number of brighteners, cleaners, gold plating solutions, oxidizing salts, and various items of plating equipment.

Prufcoat Metal Reactive Primer P-10, which provides a simple, two-step system for corrosion-proofing old or moist metal surfaces, is the topic of **Prufcoat Technical Bulletin 012** released by Prufcoat Laboratories, Inc., 63 Main St., Cambridge 42, Mass. A section of the bulletin includes questions and answers about the primer.

Titeflex Filters. An eight-page, two-color bulletin, prepared by Titeflex, Inc., 531 Frelinghuysen Ave., Newark 5, N. J., provides operating characteristics, features, and advantages of its line of filters, together with cutaway views, charts, and illustrations.

"Am I engaged in defense work?, . What do you think?!"

Finishes. A booklet describing its line of Duranite clear and pigmented synthetic baking finishes has been issued by the Industrial Finishes Department of the Atlas Powder Co., Stamford, Conn., and North Chicago, Ill. The booklet also includes data on Duranites for Controlled Temperature Application (CTA).

Cleaning Solvents Bulletins. Technical Processes Division of Colonial Alloys Co., Philadelphia 29, Pa., has available **Form No. 11142-11** describing Cyclodiene Hydrocarbon for cleaning ferrous and non-ferrous metals in a single dip operation and **Form No. 12650-12,** which discusses Tricyclodiene, a degreasing solvent for all metals.

"Use and Application of Heat-Resistant Enamels" is the title of a bulletin available from the Enamelist Publishing Co., 4150 E. 56th St., Cleveland, Ohio. B. J. Sweo, director of ceramic research for the Ferro Enamel Corporation, prepared the four-page bulletin in the interests of high temperature frits suitable for many items now being made in critical metals.

Automatic Blade Applicator for Films. Detailed information, together with illustrations and tables, is presented on this automatic applicator for laying down uniform films on hiding power charts, metal or glass, in a bulletin obtainable from Henry A. Gardner Laboratory, Inc., 4723 Elm St., Bethesda 14, Maryland.

Fundamentals of Industrial Electrochemical Measurements and Automatic Control. Measurement of pH, redox, and conductivity in industrial control systems is comprehensively covered in a 24-page bulletin prepared by Brown Instruments Division, Minneapolis-Honeywell Regulator Co., Station 40, Wayne and Windrim Aves., Philadelphia 44, Pa. Fundamental principles of electrochemical measurements, as well as final control elements for automatic control systems, are included in **Technical Bulletin No. B51-2.**

Metalprep, general all-purpose rust remover and metal cleaner, available in wipe-off and dip type grades, is described in **Metalprep Bulletins 50-34** and **50-37,** available from the Neilson Chemical Co., 6561 Benson St., Detroit 7, Michigan.

"Protecting New and Old Metal Surfaces with Longlife" is the title of a six-page folder issued by the Flexrock Co., 3615 Filbert St., Philadelphia 4, Pa. The folder tells where and how "Longlife" is used and illustrates the types of surfaces for which it is recommended. Its effects on metal and its protective qualities are mentioned in detail.

Corrosion Protective Coatings. Lacquer & Chemical Corp., 214 40th St., Brooklyn 32, N. Y., has prepared **Technical Data Bulletins 102 to 112** inclusive descriptive of its series of coating materials for protection against the effects of moisture and fungus growth. Government specifications are cited, where applicable.

Cambridge Bulletin No. 87, depicting many types of woven wire cloth, wire screens, and filter cloth available for special applications, can be obtained from The Cambridge Wire Cloth Company, Cambridge, Maryland.

Nobles Air Drawn Centrifugal Dryer for small parts is the subject of a four-page leaflet distributed by the Nobles Engineering and Manufacturing Co., 745 E. Third St., Saint Paul 6, Minn. Specifications of the unit are provided, together with a cutaway view.

"Enamel Finishes Last Longer and Look Better on Wheelabrated Surfaces" is the title of **Bulletin No. 694** prepared by the American Wheelabrator and Equipment Corp., 19 S. Byrkit St., Mishawaka, Ind. The case studies of how Wheelabrator improves the appearance and adherence of enamel finishes on stove plate, sanitary ware, and so on, will be of interest to enameling plants.

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Symposium on Rapid Methods for Identification of Metals. Published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. 84 pages. Illustrated. Heavy paper covers. Price, $1.75.

This ASTM publication covers the most recent developments in the field of rapid methods for the identification of metals. The techniques included, some of which have not been described previously, should prove of great value especially in cases where the testing must be done in the field. Those concerned with scrap problems, stocking of various metal products, and sorting of various alloy parts should find the publication of interest and help. Also, the book should be of service to those in the field, factory, and shop.

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